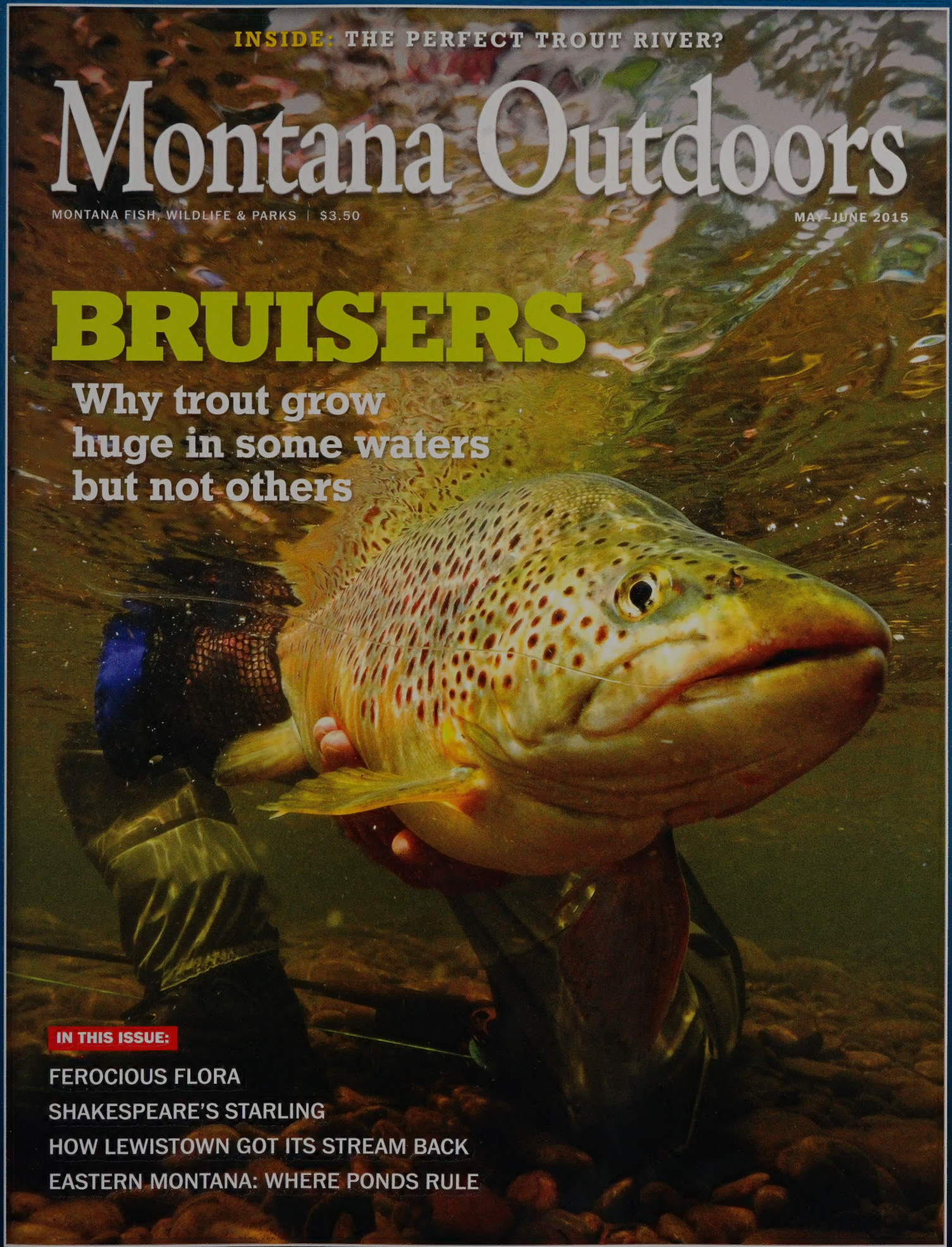

INSIDE: THE PERFECT TROUT RIVER?

Montana Outdoors

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MAY–JUNE 2015

BRUISERS

Why trout grow huge in some waters but not others

IN THIS ISSUE:

FEROCIOUS FLORA

SHAKESPEARE'S STARLING

HOW LEWISTOWN GOT ITS STREAM BACK

EASTERN MONTANA: WHERE PONDS RULE

Montana Fish, Wildlife & Parks

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BUGS BEWARE
A roundleaf sundew in Glacier National Park lures flies and mosquitoes to their death. Learn how these and Montana's other carnivorous plants capture and consume prey on page 16. Photo by Dee Linnell Blank.

FRONT COVER
Releasing a large Bighorn River brown to live another day. See page 24 to learn which Montana waters grow the biggest trout, and why. Photo by Barry Beck.

Montana Outdoors

MAY–JUNE 2015

FEATURES

10 In Love With the Gallatin
Easy to access, easy to wade, and often even easy to fish, it's no wonder the spectacularly scenic Gallatin remains one of Montana's most popular trout rivers. *By Ben Pierce*

16 Beware the Savage Sundew If you're an insect, that is. Also watch out for bladderworts and Montana's other carnivorous plants. *By Ellen Horowitz*

22 Enough For All Cooperation among irrigators, anglers, and state agencies ensures that Painted Rocks Reservoir provides the Bitterroot River with enough water for both trout and crops each summer. *By John Grassy*

24 A Recipe for Big Trout
Start with a cold, clean river, add organic elements and compounds that increase fertility, warm the water slightly in sunshine, then make sure too many fish aren't competing for food. Mix thoroughly. Serves many happy anglers. *By Jeff Erickson*

30 Making Things Right Again After high levels of PCBs in Big Spring Creek were discovered coming from its Lewistown hatchery, FWP was faced with a dilemma: wait for other state and federal agencies to tell it what to do, or start cleaning up the mess and winning back the community's trust. *By Todd Wilkinson*

36 Panfish on the Prairie Eastern Montana's fishing ponds may not draw the tourists that mountain trout rivers do. That's fine with local anglers, who are happy to have places to catch abundant, tasty fish all to themselves. *By Jack Ballard*

DEPARTMENTS

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41 OUTDOORS PORTRAIT American White Pelican

All are welcome

Great article on morels ("Secrets of a Morelling Master," March-April). One question: Can nonresidents join the Western Montana Mycological Association?

Art Lundgren
Milwaukee, WI

WMMA founder Larry Evans tells us that membership is open to anyone. Visit fungaljungal.org to join.

Fire works

I applaud "Sonny" Stiger's recommendation of using controlled fires to preserve mountain grasslands (March-April, "Letters"). While working as a forester in the New Mexico mountain ranges, Aldo Leopold found that fire suppression on mountain grasslands eventually leads to greatly increased soil erosion. Once the soil is gone, the grasslands can never be restored.

Jerry Heiman
Campbellsport, WI

Medical reading material

A few years ago, while accompanying my wife to her doctor's office, I sat down and came across an issue of *Montana Outdoors*. As I sat there and read the stories and looked at the pictures, I thought: What a wonderful magazine. I have to admit, I considered taking that issue, but I knew that was wrong and my conscience would not let me. Who was I to take away from someone else the joy of reading this fine publication while in the doctor's waiting room?

What this magazine was doing in a medical office in northeast Tennessee, I will never know. But whatever the reason, I am glad it was there. Immediately when I returned home I signed up for a three-year subscription. I have never regretted it. This is a fine publication and I would like to thank

Secrets of a Morelling Master
A day afield with Montana's "Mushroom Whisperer"

the people who put it together so that readers can see and read about the great outdoors in your part of our country. I have never been to Montana, but if I do ever decide to take a trip out West, you know where I will be heading. Thank you again, Montana Fish, Wildlife & Parks.

Vic Burk
Chuckey, TN

Smallmouth mystery

Like FWP officials, I'm concerned about the spread of nonnative fish species into Montana waters. On two separate trout fishing trips last summer, I caught between five and ten smallmouth bass in the Yellowstone River near Reed Point. I don't think they got there from a "bucket biologist." Some years back, didn't FWP stock smallmouth in the Tongue River, which flows into the Yellowstone near Miles City? I would think smallmouth bass would be one of the worst fish to have in a blue-ribbon trout river like the Yellowstone. They have voracious appetites and seem to do well in cold water. Shouldn't FWP instruct fishermen to kill any smallmouth bass they catch in the Yellowstone? Otherwise, it won't be long before they are in the entire Yellowstone River system, including Yellowstone Lake in Yellowstone Park, where they will be eating cutthroat trout.

Lew Melby
Glendive

Mike Backes, FWP regional fisheries manager in Miles City, replies: FWP stocked smallmouth bass in the Tongue River downstream from Tongue River Reservoir from 1966 to 1969, before biologists knew of potential threats to native fish populations. Decades ago, smallmouth bass were also stocked in the Yellowstone and Bighorn Rivers. Although I'm unaware of the source, Yellowtail Reservoir also has an abundant smallmouth bass population. Also, in 1972 smallmouth bass stocked by Wyoming Game and Fish in a Wyoming pond washed down into Tongue River Reservoir. Although stocking bass in rivers no longer occurs, the abundant populations in Yellowtail and Tongue River Reservoirs have become the seed sources for downstream bass migrations. Smallmouth are also reproducing in the Tongue and Yellowstone Rivers. Like Mr. Melby, FWP is concerned about how this population could affect other species, particularly natives, both up- and downstream.

One big concern is that smallmouth compete with native sauger for food. So far our monitoring has not shown a decline in sauger in areas with abundant smallmouth bass. I suspect that is because there is so much forage in the rivers that there's enough for the natives and, at least for now, the introduced non-natives.

Though wary of its effects on native fish species, we also recognize that the smallmouth bass fishery has become popular with many anglers. Smallmouth bass eagerly take a lure and put up an aggressive fight. Even so, we often inform anglers that harvesting the non-native smallmouth is a good conservation measure for other species. We continue to monitor the fishery and will consider making management or harvest limit changes if we find that smallmouth are harming other fisheries.

> "Though wary of its effects on native fish species, we recognize that the smallmouth bass fishery has become popular with many anglers."

Corrections

The March-April "Outdoors Report" should have stated that the wettest spot in Montana, with an annual precipitation average amount of 100 to 120 inches, is an unmanned weather station located near Grinnell Glacier in Glacier National Park.

Speak your mind

We welcome all your comments, questions, and letters to the editor. We'll edit letters as needed for accuracy, style, and length. Reach us at Montana Outdoors, P.O. Box 200701, Helena, MT 59620-0701. Or e-mail: tdickson@mt.gov.

Drum and Chips

By Tom Dickson | Preparation time: 20 minutes | Cooking time: 30 minutes | Serves 4 to 6

Right about now, the fishing is picking up on the lower Missouri and Yellowstone Rivers. Anglers after catfish, shovelnose sturgeon, walleye, and sauger in those water will often hook a silvery-sided fish with a high sloping forehead and thin, white lips. Those 2- to 3-pound fish are freshwater drum, and they should go into the livewell or on a stringer, because they are great to eat.

Drum, also known as sheepshead, are a Montana native also found throughout central and eastern North America from the Yukon to the Yucatan Peninsula. They are closely related to saltwater members of the drum family, and in the South are often used as freshwater substitutes in the famous dish Blackened Redfish.

In Montana, drum are found throughout the lower Missouri and Yellowstone Rivers and their tributaries. (The closest places for western Montana anglers to find drum are the Marias River and the Missouri downstream from Great Falls.)

Drum can be filleted just as you would any other game fish. The white meat is firm, bone free, and delicious—indistinguishable from walleye or perch when cooked. I trim off the strip of gray fatty meat on fillets of larger specimens.

I've been eating drum and writing about its culinary qualities for 25 years. But if you still have doubts, a sure-fire way to prepare drum is as fish and chips. The recipe here is an amalgamation of various recipes I've tried over the years, including one by Hank Shaw, author of the James Beard-award-winning blog "Hunter Angler Gardener Cook." This recipe also works well with other boneless, white-fleshed game fish such as perch and walleye, as well as cod, shark, tilapia, haddock, or pollock found in grocery stores.

The only challenge in preparing this dish is heating the large volume of oil. Do it in a 3-quart Dutch oven and use a candy thermometer to make sure the temperature does not exceed 360 degrees. This recipe also substitutes thin-sliced potatoes, which are easier to prepare, for the traditional french fries.

—Tom Dickson is editor of Montana Outdoors.

INGREDIENTS

- 2 lbs. skinless, boneless drum or other white-fleshed fish, cut into 1-inch-wide, ½-inch-thick strips
- Salt
- 2 qts. vegetable oil (safflower or sunflower is best) for frying
- 2 lbs. russet or Yukon gold potatoes, sliced into ⅛-inch-thick rounds
- ½ c. flour
- 1 t. baking powder
- 1 t. salt
- 7 oz. brown beer, cold

DIRECTIONS

Salt the fish and set it aside. Start heating the oil: You want it to be between 350 and 360 degrees. Turn the oven to the lowest temperature and put a cookie sheet inside with a wire rack atop the cookie sheet.

Mix the flour, baking powder, salt, and beer. Refrigerate for 15 to 20 minutes.

While the batter is resting, slice the potatoes and put them into a large bowl of cold water. When you are done slicing, remove the potatoes and pat them dry with a paper towel.

The oil should be hot by now. Fry the potato slices, 10 to 12 at a time, for 3 to 5 minutes, or until they start to brown at the edges. Don't wait until they are uniformly brown or they will overcook (the chips continue to brown a little out of the fryer). Remove the potatoes with a slotted spoon and salt immediately. Store each batch on the wire rack in the warm oven.

Once the potatoes are done, take the batter out of the refrigerator. Dip the fish in the batter and let the excess drip off for a second or two. Holding one end of the battered fish, lower each piece gently into the hot oil, being careful not to splash yourself.

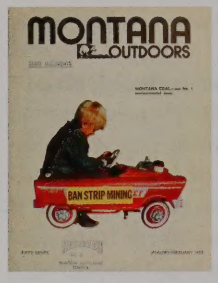
Fry in batches for 5 to 8 minutes until golden brown and crisp. Remove from the oil and salt each batch at once. Keep warm in the oven with the potatoes while you finish the rest.

Serve the fish with lemon and tartar sauce, aioli, or malt vinegar along with the potatoes.

HOLLY A. HEYSER

Still going strong after 45 years

First issue:
November–December 1970



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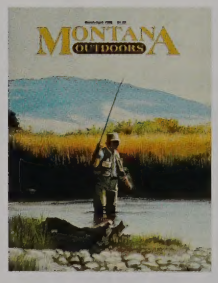


March–April 1985

The magazine you hold in your hands celebrates its 45th anniversary this year. In an era of increasingly electronic media, when many print magazines have gone out of business, *Montana Outdoors* is not only a survivor but is now more popular and successful than any time in its history.

This department launched *Montana Outdoors* in 1970 as a way of telling the public about the state's fish and wildlife conservation issues, management, research, and recreation. Montana fish and wildlife populations and habitats are too vast and diverse for FWP to manage on its own. Only with the cooperation of hunters, wildlife watchers, anglers, landowners, and others can we conserve habitat, reduce depredation, enforce game laws, recover endangered species, and otherwise fulfill our mission as stewards of this state's remarkable fish and wildlife populations. But only if Montanans know the challenges facing fish and wildlife—and the concerns of people whose lives those resources affect—can all of us be partners in this important conservation work.

That's where *Montana Outdoors* comes in.

Over the past 45 years the magazine has covered every major conservation issue in Montana: In the 1970s these included strip mining coal, efforts to dam the Yellowstone River, stream protection legislation, and growing subdivision development. In the 1980s *Montana Outdoors* reported on wild trout management, stream access, endangered species conservation, steel shot, and Block Management. In the '90s the issues included whirling disease, game farm hunting, Indian treaties, and the conflict between private land rights and public wildlife rights.

During the past 15 years, the magazine has covered coal-bed methane development, Yellowstone bison, wolf and grizzly restoration, diversion dams, brucellosis and other diseases, trapping, wildlife migrations, pallid sturgeon and cutthroat trout restoration, endangered species recovery, acid mine drainage, hunting access, climate change, and hunter-landowner relations, to name several topical subjects.

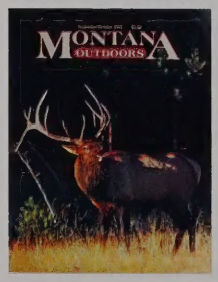
And those are just the issues. *Montana Outdoors* also brings readers updates on wildlife research, like our elk study in the Bitterroots, and articles on habitat conservation and population monitoring. And the magazine publishes entertaining and informative profiles of people, rivers, lakes, and wildlife, as well as game recipes, outdoor recreation tips, and the popular annual photo issue.

Only if Montanans know the challenges facing fish and wildlife—and the concerns of people whose lives those resources affect—can all of us be partners in this important conservation work. That's where *Montana Outdoors* comes in.

Readers like what they see. Paid circulation continues to stay strong and is currently higher than ever. *Montana Outdoors* has also been named by the Association for Conservation Information as the nation's number one or number two state conservation magazine in 8 of the past 11 years.

In our fast-changing world, it's reassuring to still be able to count on a few things. Each June salmonflies will hatch on the Big Hole. In September the mountains will echo with the sound of bugling elk. And every eight weeks, the latest issue of *Montana Outdoors* will arrive in your mailbox, bringing you and your family the latest information about Montana's fish and wildlife management and recreation. That's been happening for 45 years, and I'm hoping it continues for another 45.

—M. Jeff Hagener, Montana Fish, Wildlife & Parks Director



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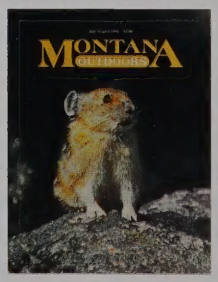

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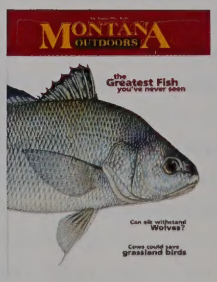

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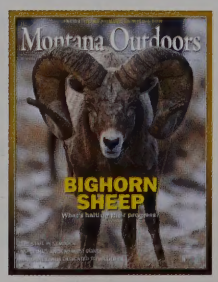

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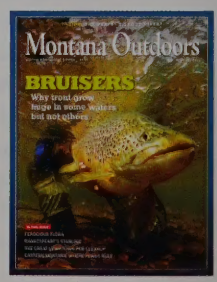

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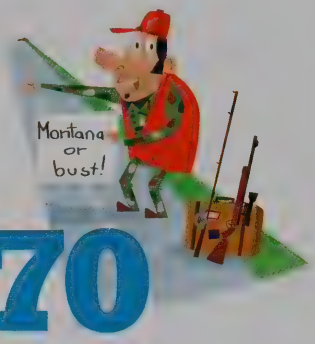
JEREMIE HOLLMAN

KOKANEE KING

MARK KORNICK
Hatchery Manager, Somers

I'm looking at a canister of three-month-old kokanee salmon fry. [Fish culturist] Brad Flickinger and I produce the state's kokanee eggs and fish here at the Flathead Lake Salmon Hatchery in Somers and also at the recently built Rose Creek Hatchery near Bigfork. In addition to kokanee, we spawn and rear arctic grayling, rear westslope cutthroat and brook trout for stocking in high mountain lakes, and spawn a unique rainbow-cutthroat trout hybrid exclusively for Ashley Lake west of Kalispell. But kokanee are our main focus, and it's really rewarding for us to know that we are the guys who produce all the kokanee stocked in Montana—and also in a few other states with which Montana trades fish. Montana's kokanee anglers are passionate about their sport, and we like knowing that most of the kokanee they catch (some kokanee reproduce naturally in the wild) started out right here in these two hatcheries under our care.

Photojournalist **ERIK PETERSEN** of Clyde Park was returning from a photo assignment in eastern Montana last June when he decided to camp at Makoshika State Park for a few days to photograph the area's remarkable geologic formations. "I'd seen these hoodoos the night before and got up early, around 4:30, and hiked out to see what they looked like at dawn," Petersen says. "I lucked out, because the sky was cloudy that morning but then the sun peeked through the clouds from the east and cast this orange-green tint onto the sandstone formations. That warm, filtered lighting, along with all the late spring vegetation, made the other-worldly setting of Makoshika even more magical." ■



70

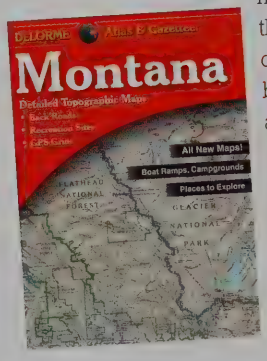
Approximate percent of FWP hunting and fishing license revenue that comes from nonresident hunters and anglers.

Old-school navigation

What's the most indispensable tool for recreating in Montana's outdoors? A pocket knife? A compass? Bear spray?

We'd argue that it's DeLorme Mapping's *Montana Atlas & Gazetteer*. It's rare to find a Montana hunter, angler, or birder who travels without a tattered, dog-eared copy of "The Gazetteer" lodged somewhere within easy reach of the vehicle's driver's seat.

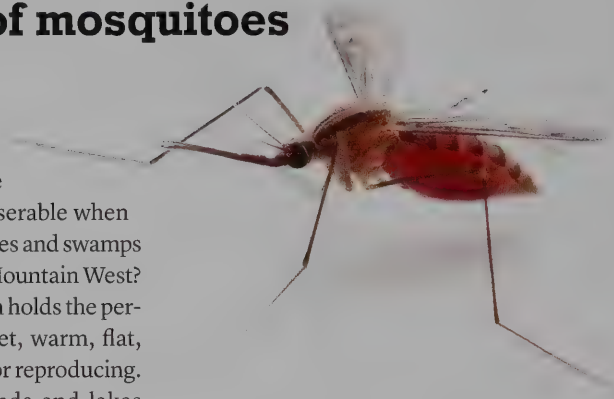
Yes, smartphones contain GPS and navigational devices, not to mention apps that show precise land boundaries and ownership. Maybe a person can navigate Rhode Island on a 2-inch-by-3-inch screen, but in a state that's 600-plus miles wide, you need to lay a big map out on a table to fully understand where things are.



A similar resource, also much used in the *Montana Outdoors* office as well as for recreational activities, is the *Montana Road & Recreation Atlas*, published by Benchmark Maps.

OUTDOOR LIFE

The hills—and plains—are alive with the sound of mosquitoes



Bzzzzz. Slap!

Visitors to Montana are often surprised to find mosquitoes here. Everyone knows the muggy Midwest and South turn miserable when clouds of skeeters rise up from marshes and swamps in midsummer. But the arid Rocky Mountain West?

It turns out that much of Montana holds the perfect combination of conditions—wet, warm, flat, and grassy—that mosquitoes need for reproducing.

Though most people think ponds and lakes breed mosquitoes, the insects actually reproduce best in stagnant shallow water less than a foot deep. Add vegetation, where the larvae can escape fish and other predators, and conditions become ideal. Mosquitoes swarm along stream and river floodplains after spring floods subside—the Milk River is notorious—and in flood-irrigated farm fields such as those along the Big Hole and Ruby Rivers.

Lacking places for water to pool, steep mountainsides generally stay mosquito free. But level mountain meadows are notoriously buggy. And because these areas are only snow free for a month or two each year, giving mosquitoes little time to gain blood for egg production, the insects become especially voracious.

Female mosquitoes lay eggs on water or on dry land subject to flooding. Because it usually takes one to two weeks for a mosquito to become a flying adult, production will be limited if standing water dries up within that period. Also, adults live for only a few weeks, which is why even the buggiest floodplains often lack mosquitoes during the dry season of July through September. Once frost hits, any remaining adults die and standing water freezes. But if conditions remain warm and wet, the pests can stick around well into fall.

Both sexes feed mainly on plant nectar. To produce eggs, the female must also supplement her diet with the protein in animal blood. She uses her tubelike probiscus to pierce the skin and draw out the fluid. That's the "bite" you first feel. The itchiness and welt—known as a wheal—at the bite site comes from an allergic reaction to the bug's saliva.

Rather than scratch the itch, which only aggravates the skin, apply ice or an analgesic cream. Another option is to lightly poke—though not scratch—the welt a few times with a twig or plastic fork. The slight pain confuses the brain and causes it to temporarily "forget" about the itchiness. ■

Tips for keeping mosquitoes at bay

- AVOID wet, grassy areas near lakes, rivers, streams, ponds, and irrigated fields.
- TIME activities for midday. Mosquitoes feed mainly at dawn and dusk. During summer days they hang out in shady areas waiting for the temperature to drop.
- MELLOW OUT. Mosquitoes seek out people who are hot, moving, and perspiring. Though it's hard to stay still with that buzzing in your ear, your anxiety and excessive swatting will just attract more skeeters.
- COVER UP. Wear lightweight long pants and long-sleeved shirts. The various lines of UV-protection clothing work great. Add lightweight cotton gloves and a headnet, and you can stay comfortable in even the buggiest environments.
- TRY the nuclear option. Bug dope works at keeping mosquitoes away, but you pay a price for that protection. The most effective sprays contain 30 percent or more DEET, a chemical compound that feels oily and sticky on the skin and can actually eat away synthetic fabrics.

DUCKING FROM TOP: GET; CARTOON ILLUSTRATION BY MIKE MORAN; SHUTTERSTOCK; KAPPLER; DELORME

WILDLIFE MANAGEMENT

It's turkey time

Most people see a picture of a tom (male) turkey and think "Thanksgiving." Turkey hunters see the same picture and think "spring hunt."

That's because the mating season is when a hunter can locate a gobbling tom, sneak to within a few hundred yards, then imitate the sound of a hen turkey to lure the bird to within 30 yards for a killing shot with a shotgun. (Rifles aren't allowed except during the fall season, when calling is far less effective.)

Like bugling in a bull elk in September, calling in a springtime turkey can be a thrill—when it works. Unfortunately, the birds often become suspicious when about 100 yards off and won't come any closer, no matter how seductively the hunter calls.

Wild turkeys are not native to Montana. In the 1950s, state biologists released the Merriam's wild turkey subspecies—donated by nearby states—near Lewistown, Ekalaka, and Ashland. The birds survived well enough for biologists to begin trapping home-grown turkeys and moving them to new areas of the state.

Currently, wild turkeys live in at least a portion of most Montana counties due to natural migration or FWP transplants.

Most are Merriam's wild turkeys—identified by the white tips of the tom's tailfeathers. The turkeys in the Flathead Valley are the Eastern subspecies (native east of the Mississippi River), descendants of a private flock of pen-raised turkeys released in the early 1960s. They can be identified by the tom's chestnut-brown tail tips. ■

A successful hunter carries a Merriam's gobbler back to camp.

"I'm Winston Greely, out among Montana's fish, wildlife, and parks."

Recommended Channel

YouTube is more than a website to watch piano-playing cats and Taylor Swift videos. It now features FWP Outdoor Reports.

The short videos offer the latest news and footage on Montana's fish and wildlife, from wolverines and grizzly bears to pallid sturgeon and bull trout.

Broadcast weekly on Montana's TV news stations, FWP Outdoor Reports are available for viewing at fwp.mt.gov (see the bottom of the home page). Many previous videos are also on YouTube's Montana FWP channel and available as iTunes podcasts.

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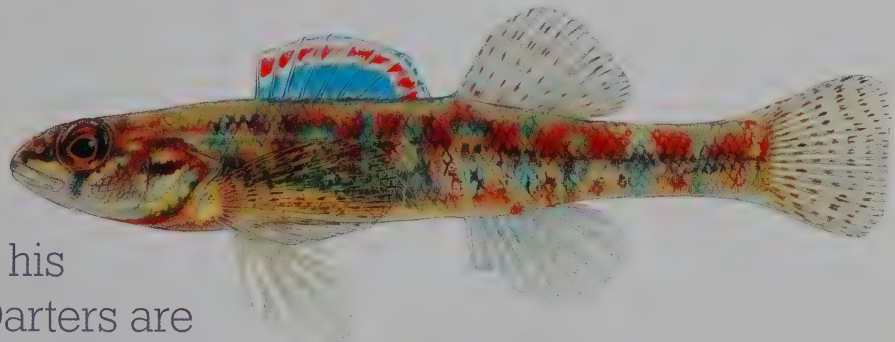
SPRING BEAUTY

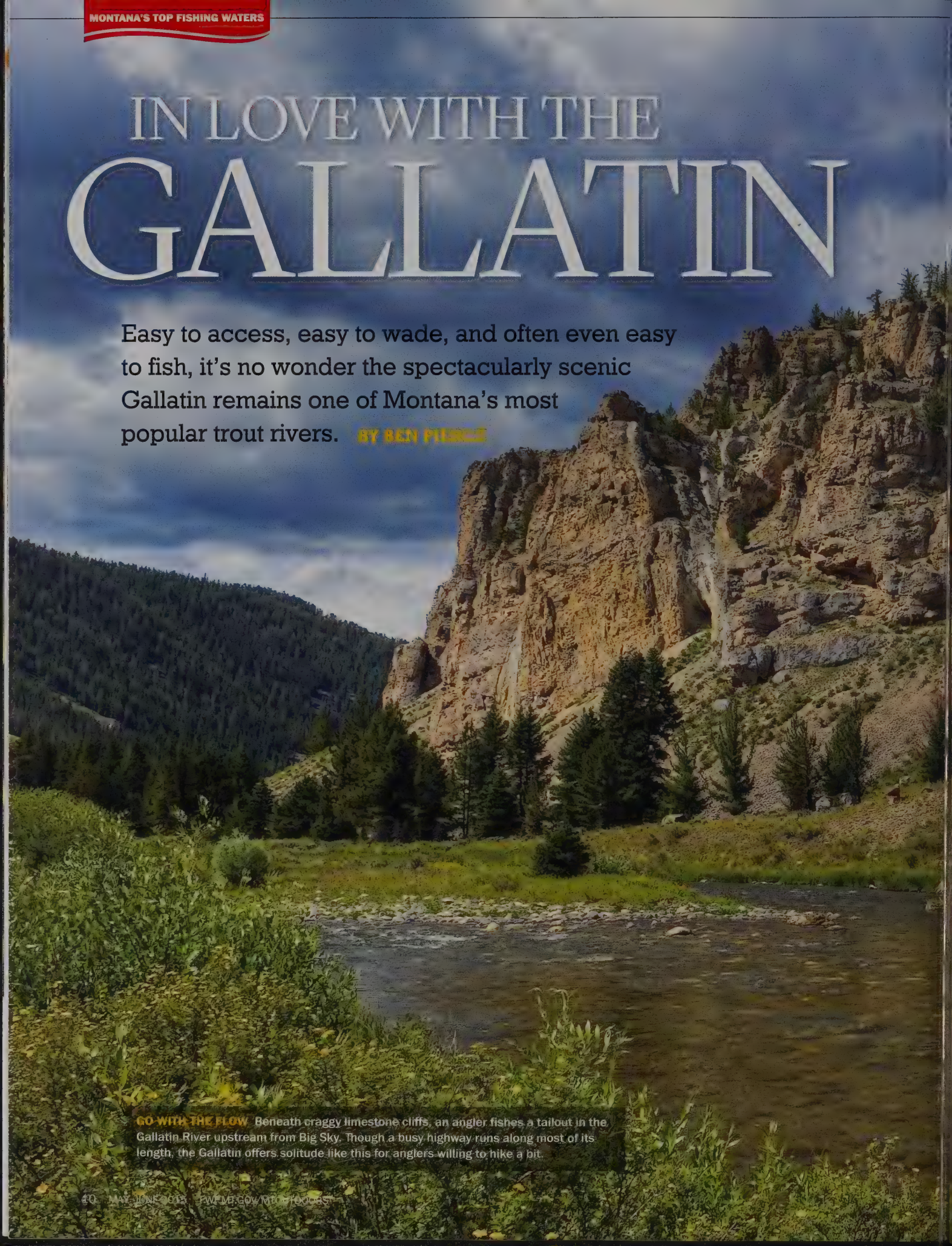


Which is Montana's most beautiful native fish? Our vote goes to the male Iowa darter, shown here in his vibrant spawning colors. Darters are tiny minnow-sized fish related to perch, sauger, and walleye that live in streams. The Iowa is Montana's only darter species. It is found in tributaries of the Missouri River downstream from Fort Peck Reservoir, and throughout the Milk River system as far west as Fresno Dam.

TOP TO BOTTOM: MONTANA FWP; DENVER BRYAN; ILLUSTRATION BY JOSEPH TOMELLERI

IN LOVE WITH THE GALLATIN

Easy to access, easy to wade, and often even easy to fish, it's no wonder the spectacularly scenic Gallatin remains one of Montana's most popular trout rivers. BY BEN PIERCE



GO WITH THE FLOW Beneath craggy limestone cliffs, an angler fishes a tailout in the Gallatin River upstream from Big Sky. Though a busy highway runs along most of its length, the Gallatin offers solitude like this for anglers willing to hike a bit.

GALLATIN RIVER ANGLER. PHOTO BY KEN IANNITI

The Gallatin River is the picture of a classic Montana trout stream. Lined with tall Douglas firs, framed by soaring snow-capped peaks, and packed with riffles, pools, and boulders, it's a river that begs to be fished.

If you've never set foot in the Gallatin, or even driven past, there's still a good chance you've seen it.

When director Robert Redford came to Montana in the early 1990s to film *A River Runs Through It*—based on the novella by Norman Maclean—he chose the Gallatin for the role of the Blackfoot River. The crest of Storm Castle Peak rising above the river graces the final scene of the film, which won an Academy Award for best cinematography.

Named by Meriwether Lewis for U.S. Treasury Secretary Albert Gallatin, the river was popular long before Brad Pitt starred in "The Movie," as it's called in Montana fly-fishing circles (often derisively, for helping overpromote a cherished sport that locals had all to themselves). As far back as the 1890s, a resort in the canyon promoted the Gallatin's superb fishing. In the 1920s, tourists who arrived at Gallatin Gateway on a branch line of the Chicago, Milwaukee & St. Paul Railway boarded the iconic Yellowstone National Park buses and took the bumpy dirt road along the Gallatin to the park entrance at West Yellowstone.

Today, a stream of traffic follows that same route through Gallatin Canyon along U.S. Highway 191 between Bozeman and Big Sky Resort or the national park. The highway parallels the river for much of its length and provides numerous access points to wadeable water that tempts anglers every inch of the way. It allows Bozeman anglers to be knee deep in trout water just 15 minutes after leaving work.

The busy road also produces a steady sound of traffic that is never far off. But for Bozemanites who consider the Gallatin their home river, and for anglers who visit from throughout the world, the periodic roar of a passing semi is a small price to pay for quick and easy access to water so productive, so scenic, and, at times, so easy to fish.

UPPER RIVER

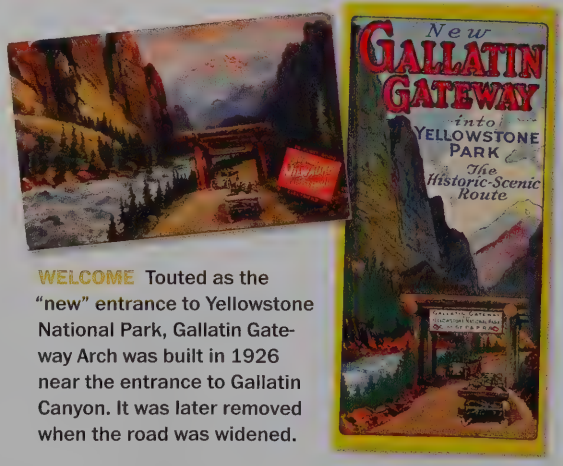
As might be expected of a river running 115 miles, the Gallatin varies widely in appearance and personality from beginning to end. The river starts as an outlet of Gallatin Lake in Yellowstone National Park's northwestern corner. Here, where the shallow, riffly creek meanders through meadows dotted with willow and sagebrush, an angler might spot moose, elk, and even bison. The stream is dominated in this stretch by small but eager rainbows, which, along with the Gallatin's brown trout, were first stocked during the early 1900s. Mike Vaughn, recently retired FWP biologist in Bozeman, says that before the introduction of non-natives, the Gallatin was home to arctic grayling, mountain whitefish, and westslope cutthroat.

Though the grayling are gone, plenty of whitefish and an occasional cutthroat remain in the upper river, a stretch that runs down to near the confluence with the Taylor Fork. "Every so often you'll be surprised by a 16-inch cutt up there," says Matt Ruuhela, of Wild Trout Outfitters in Big Sky.

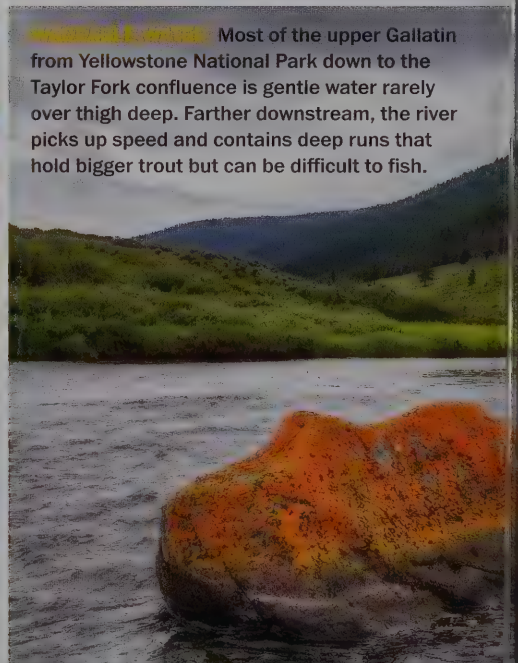
Ruuhela adds that many anglers avoid the upper Gallatin within Yellowstone because it requires a park fishing license. "There's lots of beautiful water that gets little pressure," he says. "You can drive or hike along miles of river in the park and not see anyone."

Solitude quickly disappears downstream from the park boundary, where the Gallatin becomes a popular recreational playground. Traditionally used only by trout anglers and picnickers, the river in recent years has attracted growing numbers of whitewater kayakers and rafters. Paddlers test their grit and skill on the Gallatin's Class IV rapids during spring runoff, when water surges wildly through House Rock Rapid and the Mad Mile in Gallatin Canyon.

While kayaks and other watercraft can be abundant on the Gallatin during high water, anglers cannot fish from a boat except in the



WELCOME Touted as the "new" entrance to Yellowstone National Park, Gallatin Gateway Arch was built in 1926 near the entrance to Gallatin Canyon. It was later removed when the road was widened.



Most of the upper Gallatin from Yellowstone National Park down to the Taylor Fork confluence is gentle water rarely over thigh deep. Farther downstream, the river picks up speed and contains deep runs that hold bigger trout but can be difficult to fish.

Ben Pierce is outdoors editor for the Bozeman Daily Chronicle.

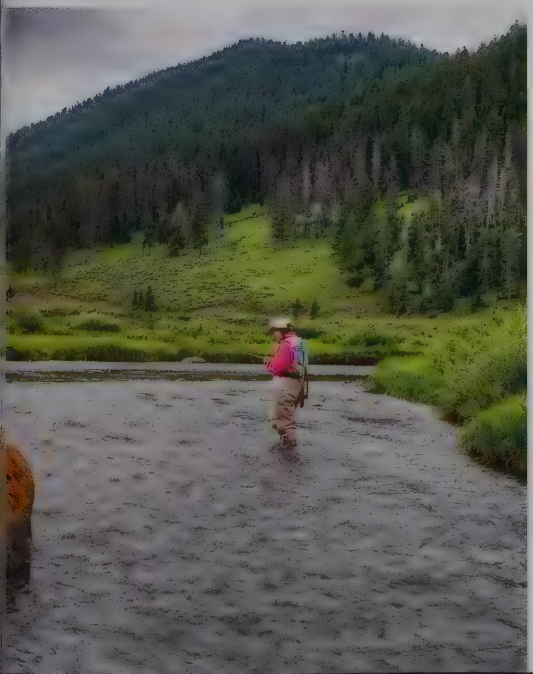
river's final 10 miles. To preserve its unique wade-fishing experience, the Gallatin is closed to float fishing from the park boundary to the mouth of the East Gallatin River near Manhattan, about 20 miles northwest of Bozeman. "The Gallatin offers a slower pace of fishing," Ruuhela says. "In other rivers where you can fish from a boat, you float by a hole and get a few casts. On the Gallatin, where you're walking and wading, you can spend two or three hours in one spot. It's a good place for beginners, because you have time to learn a stretch of water, and you don't need to deal with the complexity of casting from a moving boat."

CANYON STRETCH

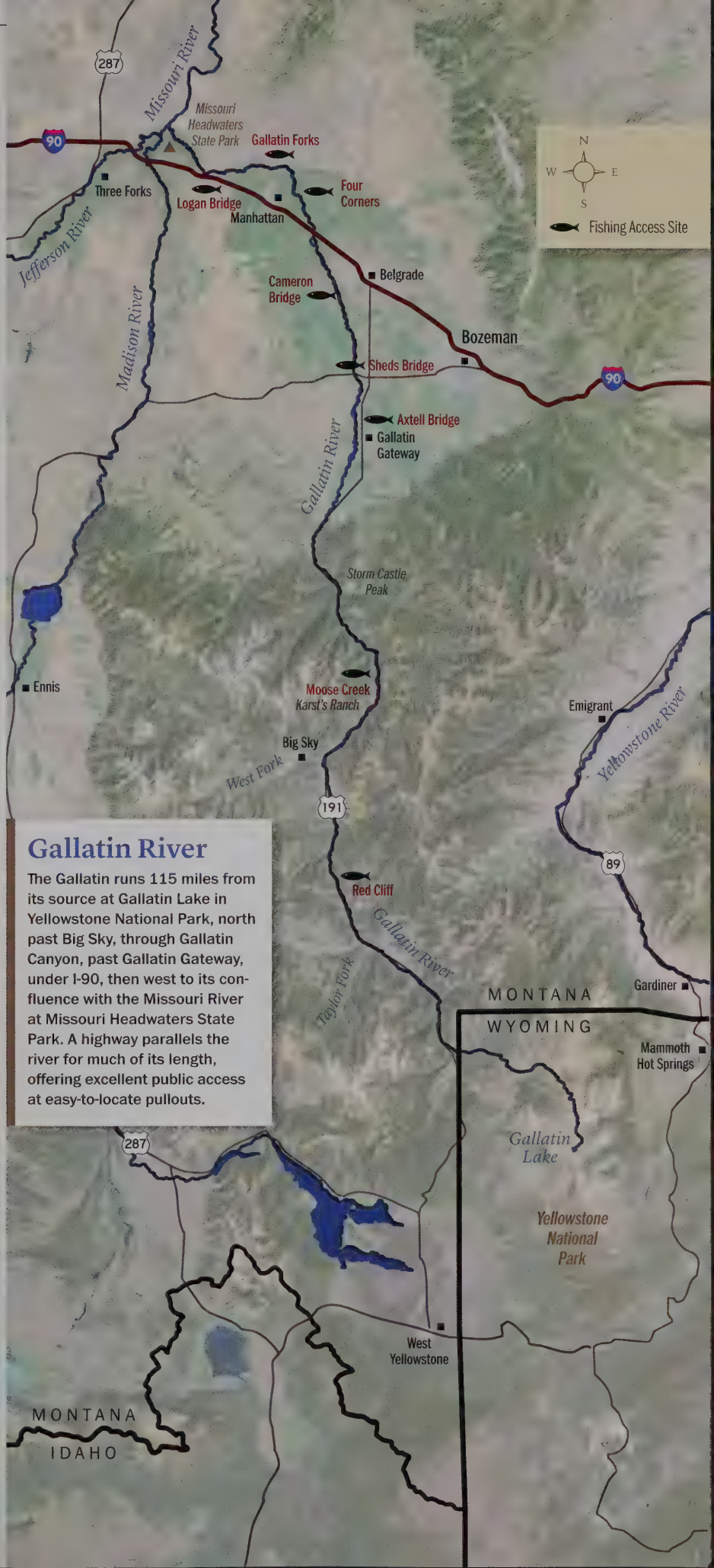
About 15 miles downstream from where the Gallatin leaves the park, the Taylor Fork enters. The river now becomes bigger and sometimes murkier. After rains, volcanic duff in the Taylor Fork watershed causes the tributary to muddy the Gallatin for miles.

This is the start of the canyon stretch. The canyon bisects the Madison Mountains to the west and the Gallatin Range to the east while the river cuts through towering ocher-hued limestone cliffs and gains volume from tributaries. From the historic 320 Guest Ranch, founded in 1898, downstream to Big Sky, the river is primarily riffles and shallow pocket water behind midstream boulders.

The most heavily used section of the Gallatin extends from the confluence of the West Fork (of the Gallatin River) at Big Sky

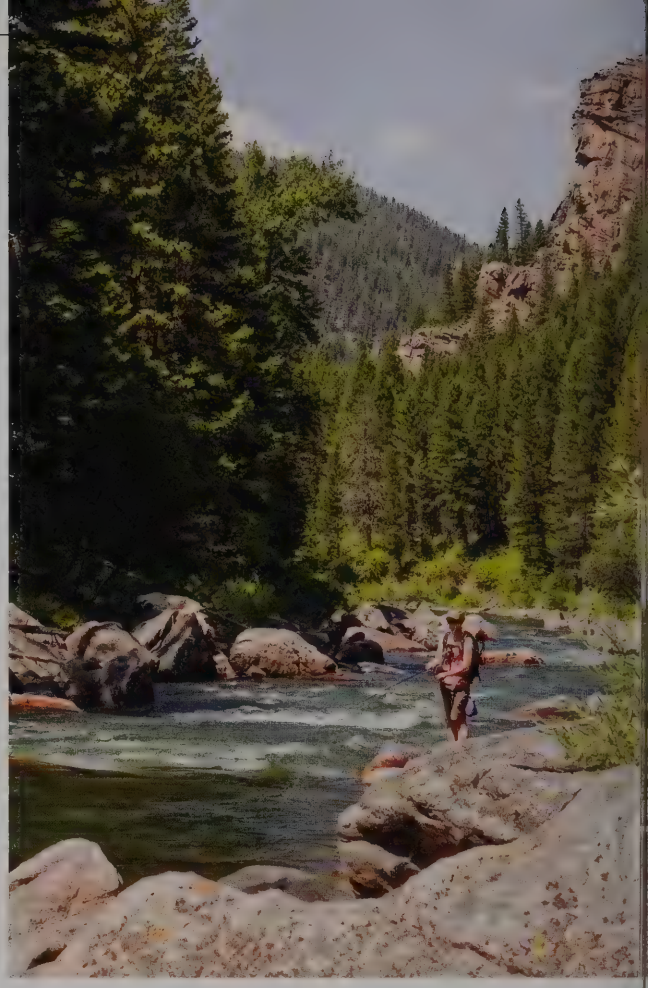


LEFT TO RIGHT: NPS.GOV; JOHN JURACEK; MAP BY LUKE DURAN/MONTANA OUTDOORS



Gallatin River

The Gallatin runs 115 miles from its source at Gallatin Lake in Yellowstone National Park, north past Big Sky, through Gallatin Canyon, past Gallatin Gateway, under I-90, then west to its confluence with the Missouri River at Missouri Headwaters State Park. A highway parallels the river for much of its length, offering excellent public access at easy-to-locate pullouts.



downstream to Karst's Ranch. Established in 1901 as a dude ranch by Pete Karst—prospector, entrepreneur, and founder of a stagecoach line—the now-defunct camp once boasted 56 cabins, Montana's first ski tow, a museum, a saloon, a brothel, and a swimming pool heated from an old boiler. Also known as Karst's Camp, the ranch served tourists as well as laborers who worked at a nearby asbestos mine.

Big Sky Resort is the Karst's Ranch of the 21st century. Envisioned by NBC newscaster and Montana native Chet Huntley, Big Sky Resort opened to the public in 1973. Following Huntley's death in 1974, the resort was purchased by Michigan-based Boyne Resorts. The following decades brought tremendous growth to Big Sky Resort, which—with acquisition of adjacent Moonlight Basin Resort in 2013—is now the nation's largest ski complex.

In summer and fall, the Big Sky Resort complex hosts weddings, corporate gatherings, and business conferences. Not surprisingly, all that growth has fisheries biologists keeping a close eye on the water. "With more development and more people, we are concerned about the potential for worsening water quality in the West Fork and the effects that could have on the mainstem Gallatin," Vaughn says.

SALMONFLIES AND SPRUCE MOTHS

Downstream from Big Sky, the river continues through scenic Gallatin Canyon. The steep cliffs keep the water shaded and cool, making it a great place to fish on hot summer days. The best angling in the chilly canyon often starts around midday and runs through early afternoon, when water warmed by sunshine quickens fish metabolism and triggers hatches of aquatic insects.

Most dry fly anglers drift high-floating patterns along seams next to boulders, where trout wait for food to float past. Effective patterns include Humpies, Elk Hair Caddises, Stimulators, Royal Wulffs, Royal Trudes, and, for the spring *Baetis* hatch, small Parachute Adamses and Blue-Winged Olives. The biggest trout in the Gallatin River are taken by anglers fishing heavily weighted nymphs—like a black stonefly with rubber legs—in deep runs.

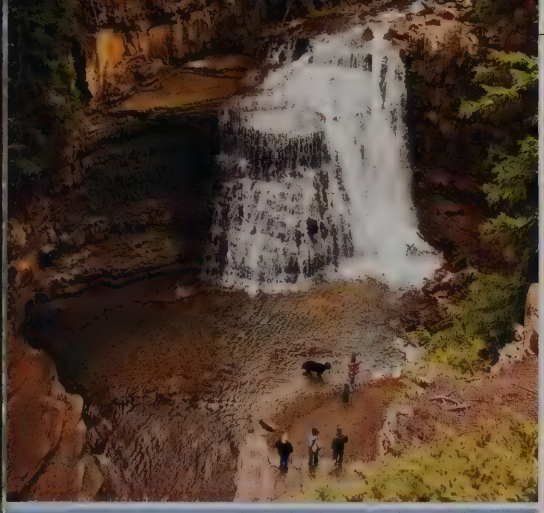
During June's high, roily runoff water, the Gallatin's largest aquatic insects—salmonflies—crawl from beneath underwater rocks onto banks, emerge from their shucks, and take flight. These giant stoneflies swarm the canyon and will occasionally bring a big trout to the surface when they land on the water to lay eggs.

Because wading can be treacherous this time of year, Ruuhela recommends using a staff. He also advises newcomers not to get stuck on fishing salmonfly dries exclusively, even when the air is filled with big bugs. If trout don't want your Sofa Pillow, Godzilla, or other adult salmonfly imitation, use smaller attractor patterns or stonefly nymphs for a few hours and then return to the big dry flies later, Ruuhela suggests. The June hatch progresses quickly up the Gallatin River into Yellowstone National Park. Look for vehicles parked in pullouts as indicators of the hatch's progress.

By early August, after runoff has subsided in the canyon, the Gallatin produces some of its best fishing. Spruce moths—terrestrial insects that feed on conifer needles—appear en masse along the river. "You always know it's going to be a good spruce moth day when, the night before, you see clouds of them swarming the streetlights in Big Sky,"

MOTH EATERS The Gallatin holds browns and rainbows, with an occasional cutthroat in the upper reaches in and near Yellowstone National Park. Some of the river's best fishing comes in early August, with the appearance of western spruce moths. High-floating yellow and amber caddis patterns work best, especially when cast near overhanging trees.

CLOCKWISE FROM TOP: JOSHUA BERGAN; THEWEEKLYFLY.NET; USFS; JOSHUA BERGAN



BOTH UNTOUCHED AND TRANSFORMED Most of the Gallatin River and surrounding area—like the canyon stretch (far left) and Ousel Falls (top left)—look no different from when trappers and miners first explored the region. Yet some aspects would be unrecognizable to early explorers. One change is the growing number of paddlers (top right) recreating in the Gallatin's Class IV rapids during late spring runoff. Another is the steady growth of Big Sky Resort (above), which attracts visitors year-round. Biologists are concerned that growing development could affect water quality of the West Fork Gallatin.

Ruuhela says. Use a high-floating yellow or amber caddis pattern and cast to water where trees hang over the river, he adds.

The Gallatin is known more for trout numbers and catchability than size. The fish run smaller than those in the nearby Madison and Yellowstone. Though 16-inchers are not uncommon, and even a few trout over 20 inches are caught each year, the fish through the canyon average 10 to 14 inches long.

Travis Horton, Montana Fish, Wildlife & Parks regional fisheries manager in Bozeman, says cold water and high fish densities limit growth. As on several other Montana rivers, the Gallatin might produce larger trout if more anglers harvested some small ones, allowing remaining fish more room to grow. "They'd probably still be smaller relative to other rivers in our region, but they'd certainly be bigger than they are now," says Horton.

LOWER RIVER

At the canyon entrance just upstream from Gallatin Gateway, the river spreads into a series of runs, riffles, and pools as it flows past housing developments and farm fields. The river then slows and meanders through the broad valley floor, often braiding into a network of channels. Though less abundant than upstream, the fish here grow larger in the sunny, fertile water.

Two miles north of the town of Manhattan, at the Gallatin Forks Fishing Access Site, the Gallatin is joined by the East Gallatin. Flowing almost entirely through private property, this small but highly productive stream provides limited public access except at bridge crossings.

Parts of the lower Gallatin downstream from I-90 used to run nearly dry some summers. But in recent years, under the guidance of water commissioner and local rancher George Alberda, many irrigators voluntarily leave water they legally could use so that trout populations have adequate flows.

During the past few years, anglers have been unexpectedly hooking northern pike in the Gallatin's lower stretches. The fish, which may have escaped from a private pond near Manhattan, spread throughout the Missouri as far downstream as Canyon Ferry Reservoir. Fortunately, because northern pike require slow, warmer water, the piscivores won't move upstream into the Gallatin's famous canyon stretch. But the predators could take a bite out of trout populations on the lower Gallatin—as well as the lower Jefferson and Madison. In response, FWP issued a no-limit regulation on the species in the three rivers and sent crews with gill nets to remove as many pike as possible on the Missouri River farther downstream. Though the predacious fish have not been totally eliminated and probably never will be, numbers are substantially reduced.

The Gallatin runs its final 10 miles to Missouri Headwaters State Park. Boat fishing is allowed in this stretch, which takes floaters through wild bottomlands containing abundant deer, beavers, mink, and waterfowl. Fly anglers catch big brown trout by working sculpin patterns and streamers along undercut banks. The fishing is especially good in fall, when spawning browns make a run up from the Missouri.

From beginning to end, the Gallatin serves up a wide diversity of fishing opportunities and scenic wonders. It definitely sees a lot of angling pressure, especially during the summer tourist season. But with more than 100 miles of fishable water, there's still plenty of river for everyone to have a stretch of the Gallatin all to themselves.

CLOCKWISE FROM UPPER LEFT: BEN PIERCE; BEN PIERCE; YELLOWSTONEPARK.COM

BEWARE THE SAVAGE SUNDEW

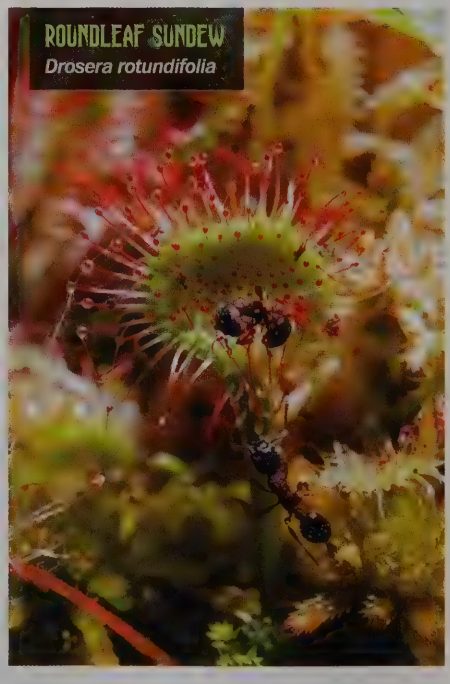
If you're an insect, that is. Also watch out for bladderworts and Montana's other carnivorous plants. **By Ellen Horowitz**

Though swarms of mosquitoes hovered around my head and whined in my ears, I had no choice but to keep going. I wanted to locate one of Montana's seldom-seen and little-known carnivores, and that required walking through this insect-infested meadow. With each carefully placed step, I scanned the spongy, sphagnum moss–covered ground. Then I saw it—a mat of dark red vegetation. Easing down onto my hands and knees, and peering closely, I could see glimmering crimson tentacles embracing the limp remains of mosquitoes.

I was face to face with a roundleaf sundew, one of Montana's carnivorous plants.

Most plants draw their nutrients from soil. Carnivorous plants obtain all or most of theirs by consuming insects, spiders, and other arthropods. Perhaps because they upend the natural order of things—in which animals are supposed to eat vegetation and not the other way around—carnivorous plants are fascinating to botanists and popular with collectors. So biologically sophisticated is the well-known Venus flytrap that Charles Darwin once described it as "the most wonderful plant in the world."

Most of the roughly 750 carnivorous plants worldwide grow only in tropical and subtropical climates. Yet a handful are native to colder regions as far north as Alaska. Montana is home to eight: three species of sundews, one species of butterwort, and four species of bladderworts. The bladderworts are aquatic plants, while the sundew and butterwort grow in nutrient-deficient environments such as bogs (a type of northern wetland covered in sphagnum moss) and fens (bogs with underground springs). The plants evolved to compensate for the lack of nutrients in the cold, acidic soil by eating small creatures—mostly insects and other invertebrates.


ROUNDLEAF SUNDEW
Drosera rotundifolia

Montana is well known for its large carnivores—wolves, mountain lions, Canada lynx, and more—but only a handful of people (readers of this article now among them) are aware that tiny vegetative meat eaters also lurk in many parts of the state.

SUNDEWS

The Venus flytrap—native only to North and South Carolina—might be the most famous carnivorous plant, but Montana's sundews are no less remarkable. Both plants belong to the Droxeraceae family, but that's where the similarity ends. Each employs a different ruse for capturing prey.

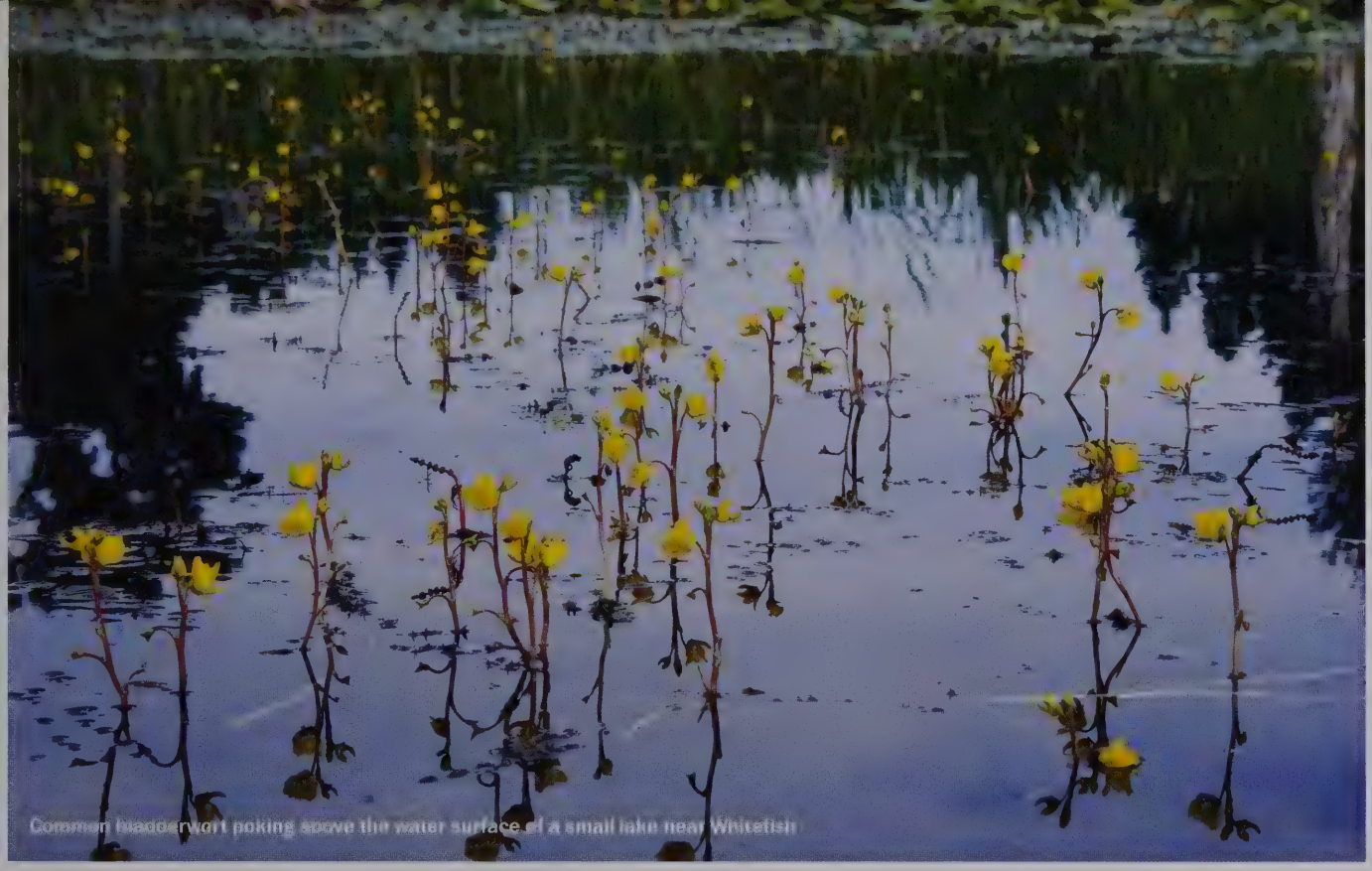
The most common of the state's three sundew species is the small, delicate roundleaf. Its leaves are the size of shirt collar buttons and attach to slender stems arranged in a rosette along the ground. From each leaf extend dozens of glistening, red tentacle-like appendages. Each tentacle supports a drop of a thick, clear, glue-like substance called mucilage. The drops sparkle in sunlight like morning dew, giving the plant its common name.

Lured by the vivid red color or the dew drops' sweet secretions, a mosquito or other small insect stopping here goes no farther.

LEFT TO RIGHT: DEE LINNELL BLANK; JOHN WINNIE JR.

ENGLISH SUNDEW
Drosera anglica

COMMON BLADDERWORT
Utricularia macrorhiza



Common bladderwort poking above the water surface of a small lake near Whitefish

The bug's frantic struggle to escape the sticky droplet proves futile. Long stalked glands—the tentacles—slowly roll inward, releasing more glue and securing the prey in the center of the leaf, which secretes acids that eventually decompose the prey. The insect suffocates in less than 15 minutes, but it may take several days for the leaf to absorb the bug juice nourishment. As the tentacles resume their upright stance, the insect's empty shell blows away, erasing evidence of the plant's previous deed. The ravenous beauty then awaits its next meal.

Montana's two other sundews, the English and the linearleaf —both listed as state species of concern—lure, capture, and digest their prey in much the same way.

In Montana, sundews typically grow among mosses in mountain fens from the state's northwestern corner southeast to the Beartooth Plateau.

BLADDERWORTS

All carnivorous plant species in Montana produce flowers, but the blossoms of bladderworts are the most conspicuous. Beginning in late June, stalks bearing bright yellow snapdragon-like flowers protrude 2 to 8 inches above the surface of shallow lakes, ponds, and backwater sloughs in major river drainages, marshes, and fens. Beneath the surface, bladderworts grow feathery branches and miniature bladder-shaped trapping mechanisms.

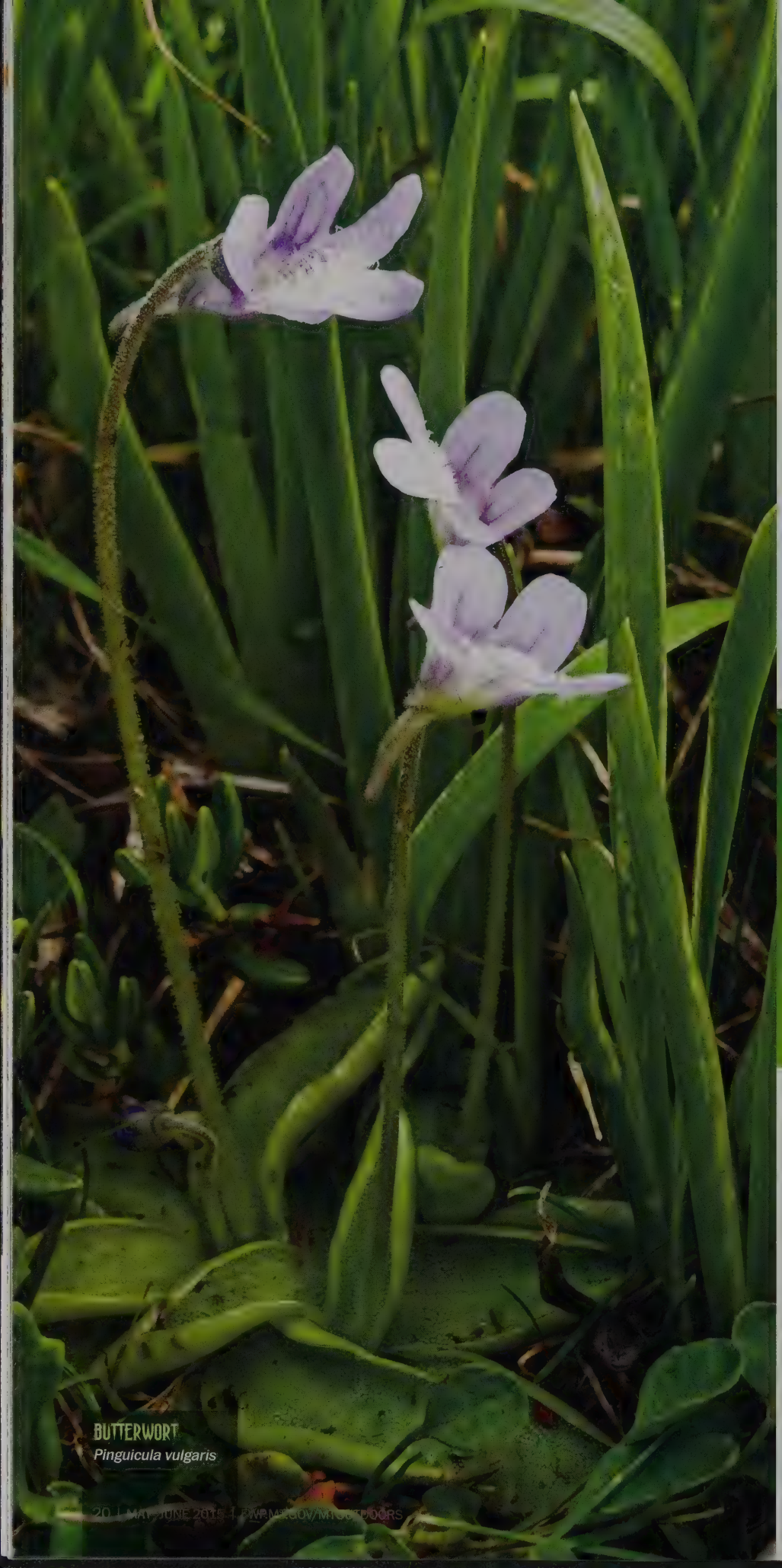
All four species (greater, lesser, northern, and flatleaf, the latter two listed as state species of concern) are found in western Montana. The range of the greater bladderwort also extends into wet areas in the state's central

Longtime Montana Outdoors *contributor Ellen Horowitz lives in Columbia Falls.*

DON'T TREAD ON THEM

Despite their ferocity to unsuspecting insects, carnivorous plants are delicate species that people can trample and kill. Seek out these plants for viewing, but do so cautiously. In fens and bogs, watch your step to be sure you're not crushing sundews underfoot. In Glacier National Park, where butterworts are found, it's better to view them through binoculars rather than stomp over mosses where the fragile plants grow. Spot their elegant lavender flowers in bloom, from about mid-July to late August, on wet, moss-covered roadside cliffs. Bladderworts, safe in the water, are the least susceptible to inadvertent trampling.

CLOCKWISE FROM LEFT: DEE LINNELL BLANK; DEE LINNELL BLANK; SHUTTERSTOCK



BUTTERWORT
Pinguicula vulgaris

and northeastern regions.

Instead of using a sticky secretion to capture prey, the bladderwort employs sophisticated vacuum-driven traps. The bladders range in size from this letter "O" to about ⅛ inch long. The sides remain compressed until a passing water flea, insect larvae, fish fry, or newly hatched tadpole brushes against a "trigger hair" at the mouth of the trap. The bladder then pops open, sucking in water and prey and snapping closed in a millisecond. There's no escape.

To consume larger prey such as baby tadpoles, the plant shuts the bladder door tightly around the animal's body before releasing digestive enzymes and digesting what's captured inside. The trap then resets. When another passerby trips a trigger hair, the door opens and the next portion of the tadpole is sucked in to be consumed. This continues until the prey is gone. The harmless-looking bladder then releases water, and the bladderwort awaits its next meal.

WHEN THE LEAVES UNFURL, SUMMER BREEZES WHISK AWAY THE VICTIMS' HOLLOW REMAINS, AND THE PLANT RESUMES ITS DECEPTIVELY INNOCENT APPEARANCE.

BUTTERWORT

Observing this final member of the state's carnivorous plant club requires a visit to Glacier National Park, the only place in Montana where butterworts have been found. Among subalpine mossy seeps and moss-covered ledges grow rosettes of 2-inch-long yellowish-green leaves. In July and August a stem emerges topped by a five-petal, funnel-shaped lavender flower.

The butterwort's genus name, *Pinguicula*, derives from the Latin *pinguis*, meaning "fat,"

and refers to the greasy (or buttery) feel of the leaves. "Wort" comes from the Old English word *wyrt* and simply means "plant." Thousands of minute glands cover the upper surface of the butterwort's slimy leaf, some producing the tacky mucilage and others secreting tissue-dissolving enzymes.

Like sundews, the butterwort lures a prey insect to its death. Mistaking the mucilage for water or nectar, gnats and other flies landing on a leaf become stuck. Slowly the leaf edges curl inward, forming a trough that pours more glue over the hapless victim and digestive secretions that dissolve it into insect stew. Consumption of the resulting nutrient-rich goo takes two to three days. When the leaves unfurl, summer breezes whisk away the victims' hollow remains, and the plant resumes its deceptively innocent appearance.

Part of the intrigue of searching for bladderworts, butterworts, and sundews is that they're botanical oddballs. They're a challenge to locate, but sighting one of these little-known carnivores doling out their version of plant kingdom justice always brings a smile to my bug-bitten face.

The sticky geranium, recently found to be semicarnivorous

MORE THAN PREVIOUSLY BELIEVED

Until publication of Charles Darwin's *Insectivorous Plants* in 1875, most botanists refused to believe that plants could eat animals. Now it appears that even more plant species exhibit carnivorous behavior than even Darwin himself imagined.

Research conducted at the University of Idaho shows that several plants with sticky hairs covering their leaves can trap insects and absorb and digest the nutrients to supplement those they draw from soil.

The sticky geranium is one. The beautiful purple-pink plants are a common sight in Montana grasslands during spring and early summer. Less obvious are the tiny glandular hairs covering the sticky geranium's leaves, which feel tacky to the touch. While the hairs defend the plant against any insect searching for a leafy meal—probably their main purpose—they also help turn some potential diners into dinner. A hungry insect alighting on a geranium leaf could suddenly find itself ensnared and slowly converted into food.

Because it derives most of its nutrients from soil, the sticky geranium isn't considered a fully carnivorous plant but it does offer another example of how some plants contend with the first law of nature: "Eat or be eaten."

LEFT TO RIGHT: DEE LINNELL BLANK; CAROL POLICH

ENOUGH FOR ALL

Cooperation among irrigators, anglers, and state agencies ensures that Painted Rocks Reservoir provides the Bitterroot River with enough water for both trout and crops each summer. **BY JOHN GRASSY**

The Bitterroot River in midsummer is an aquatic paradise. Boats filled with happy anglers float past lush hayfields in the fertile valley, framed to the east by the Sapphire Range and to the west by the Bitterroot Mountains. Punctuating the sound of songbirds, honking geese, and whining fly reels is the *swish-swish-swish* of nearby pivot irrigators watering alfalfa fields.

What a change from a few decades ago.

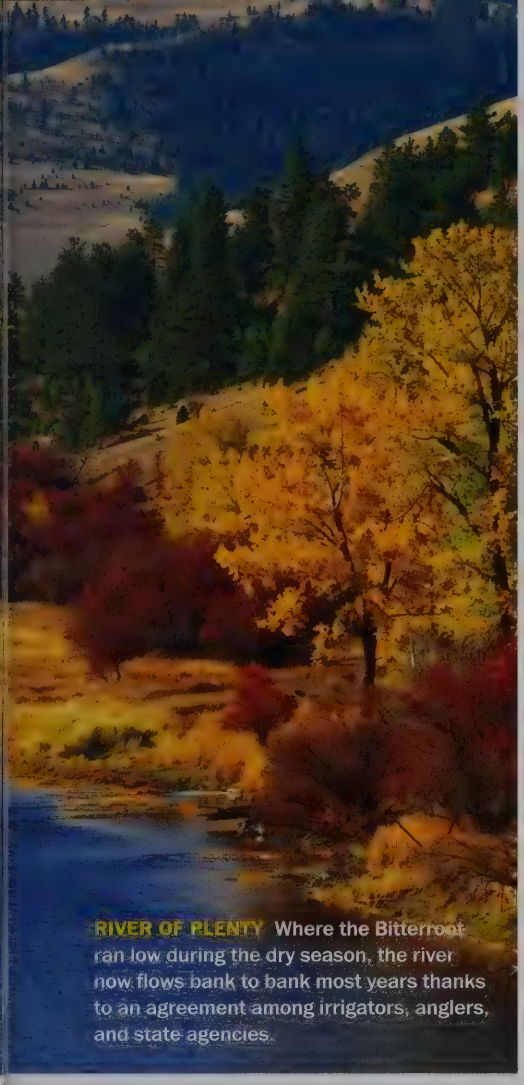
During mid- to late summers throughout much of the 1970s and early '80s, the stench of dead and dying vegetation and fish often hung heavily in the air. Tepid, brackish water crawled down the Bitterroot River channel, struggling to find a path through sun-bleached rocks covered with decaying moss. Though the river flowed strongly with deep, cold water each spring, by July little remained for trout and trout fishing.

The Bitterroot's depleted channel was nothing new. People had been struggling to manage and share the river's flows for more than a century. During the first decades of European settlement, when agriculture became the valley's primary enterprise, low late summer flows led to disputes over water rights and use. In 1940, as part of the federal Public Works Administration, the state finished construction of Painted Rocks Dam on the West Fork of the Bitterroot. The dam was built primarily to provide supplemental irrigation water to 30,000 acres of land in the Bitterroot Valley and reduce conflicts over water use.

Conservationists soon began to see that Painted Rocks could help the river's trout population too. In 1957, 5,000 acre-feet of the reservoir's 32,000 acre-feet of water was sold to the Montana Fish and Game Commission, the Ravalli County Fish and Wildlife Association, and the Western Montana Fish and Game Association. Agricultural users also purchased various amounts of water over the years, eventually leasing a total of 10,000 acre-feet.

Though some of the dam's output was intended to maintain adequate flows for trout survival, there was still insufficient water during drought years. In the 1970s and early '80s, "you could walk across the main channel and hardly get your feet wet in many stretches between Hamilton and Stevensville," says Chris Clancy, Montana Fish, Wildlife & Parks fisheries biologist in Hamilton.

John Grassy is the public information officer for the Montana Department of Natural Resources and Conservation.



RIVER OF PLENTY Where the Bitterroot ran low during the dry season, the river now flows bank to bank most years thanks to an agreement among irrigators, anglers, and state agencies.

STORAGE FOR LATER Completed in 1940, Painted Rocks Dam on the West Fork of the Bitterroot holds up to 32,000 acre-feet of water. A water commissioner ensures that leaseholders take only their fair share of water from the reservoir.

To help solve the problem, local anglers, guides, and FWP staff explored the possibility of leasing even more stored water from the reservoir, owned and managed by the Montana Department of Natural Resources and Conservation (DNRC), to supplement natural flows. FWP contracted for another 10,000 acre-feet. The DNRC agreed to conduct trial releases from the dam, which FWP biologists studied to learn about timing and flows on trout.

An informal management plan agreed to by anglers, irrigators, FWP, and DNRC in the 1980s calls for the dam to hold FWP's 15,000 acre-feet of stored water until stream flows on the Bitterroot diminish to a trigger level. Water is then released at a rate that fisheries biologists consider necessary to safeguard the fish population through the hottest, driest weeks of late summer and early fall.

As part of the agreement, FWP also pays most of the salary of Al Pernichele, who serves as both the Bitterroot River water commissioner and Painted Rocks Reservoir manager. "Al's main job is to shepherd the water down the river and make sure everyone is taking no more than their allocated amount, and also to make sure that FWP's water stays in the river," says Clancy. "He has a lot of credibility and has gained people's trust."

Over time, various interests who once competed bitterly for water started to recognize and understand each other's water uses and needs. "You see more cooperation on water management on the Bitterroot than on most rivers in the state," Clancy says. "We actually have a situation where some irrigators voluntarily don't take all the water they're entitled to. They have the earliest water rights on the river and need to keep water in their ditches well into September for stock watering and to minimize winter mortality of pasture grasses and hay. But they still leave water in the stream to benefit fisheries and recreation."

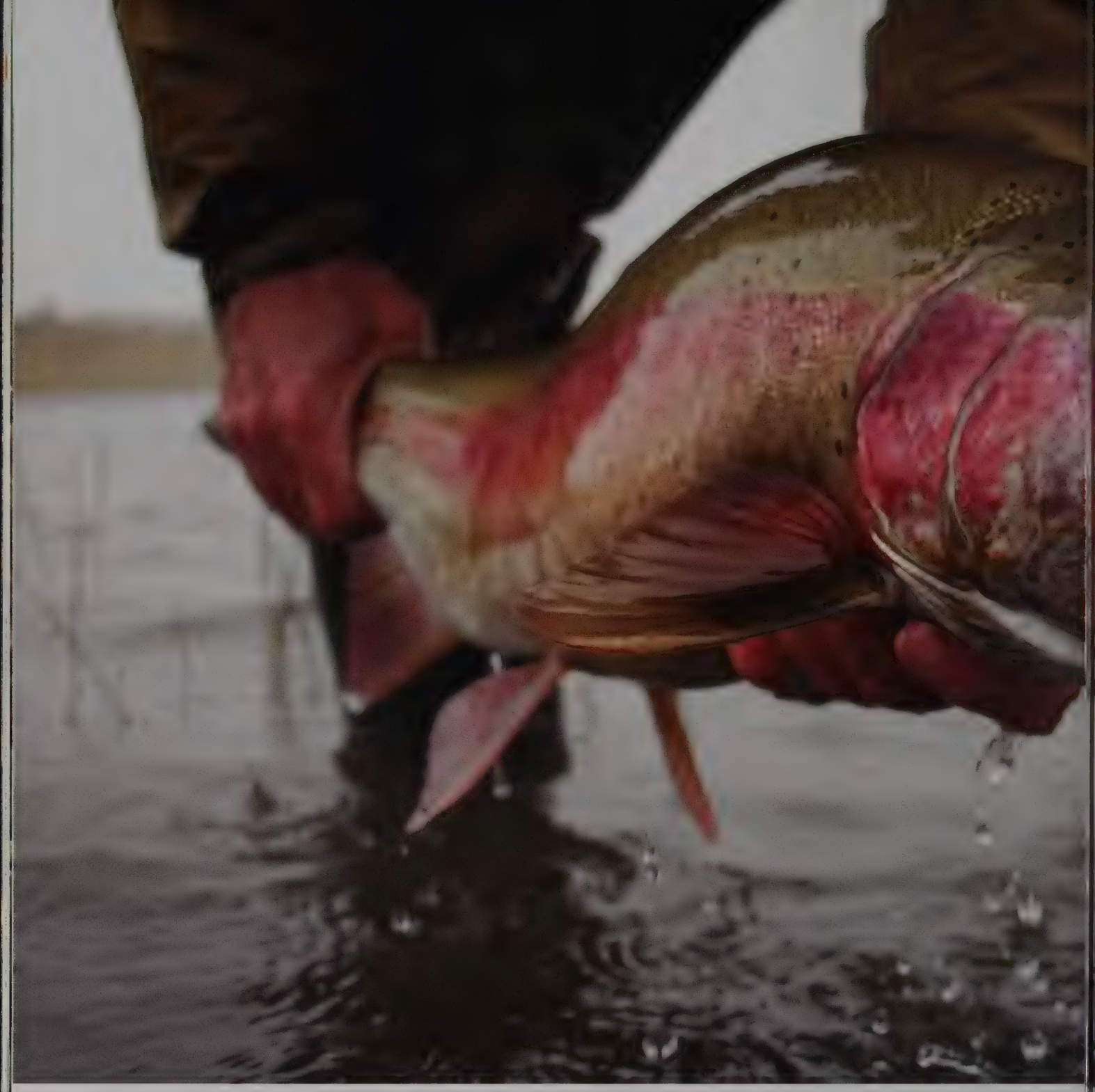
> "You see more cooperation on water management on the Bitterroot than on most rivers in the state."

Each year in mid-July, FWP requests that DNRC begin releasing water from Painted Rocks Reservoir. The goal is to maintain a minimum flow of 400 cubic feet per second (cfs) at Bell's Crossing, a monitoring site on the middle Bitterroot near Victor that in the past often ran partially dry. That flow goal can be achieved except during years with low snowpack, when the reservoir holds insufficient water. "In a really dry year, we're happy just to maintain 300 or even 200 cfs," Clancy says.

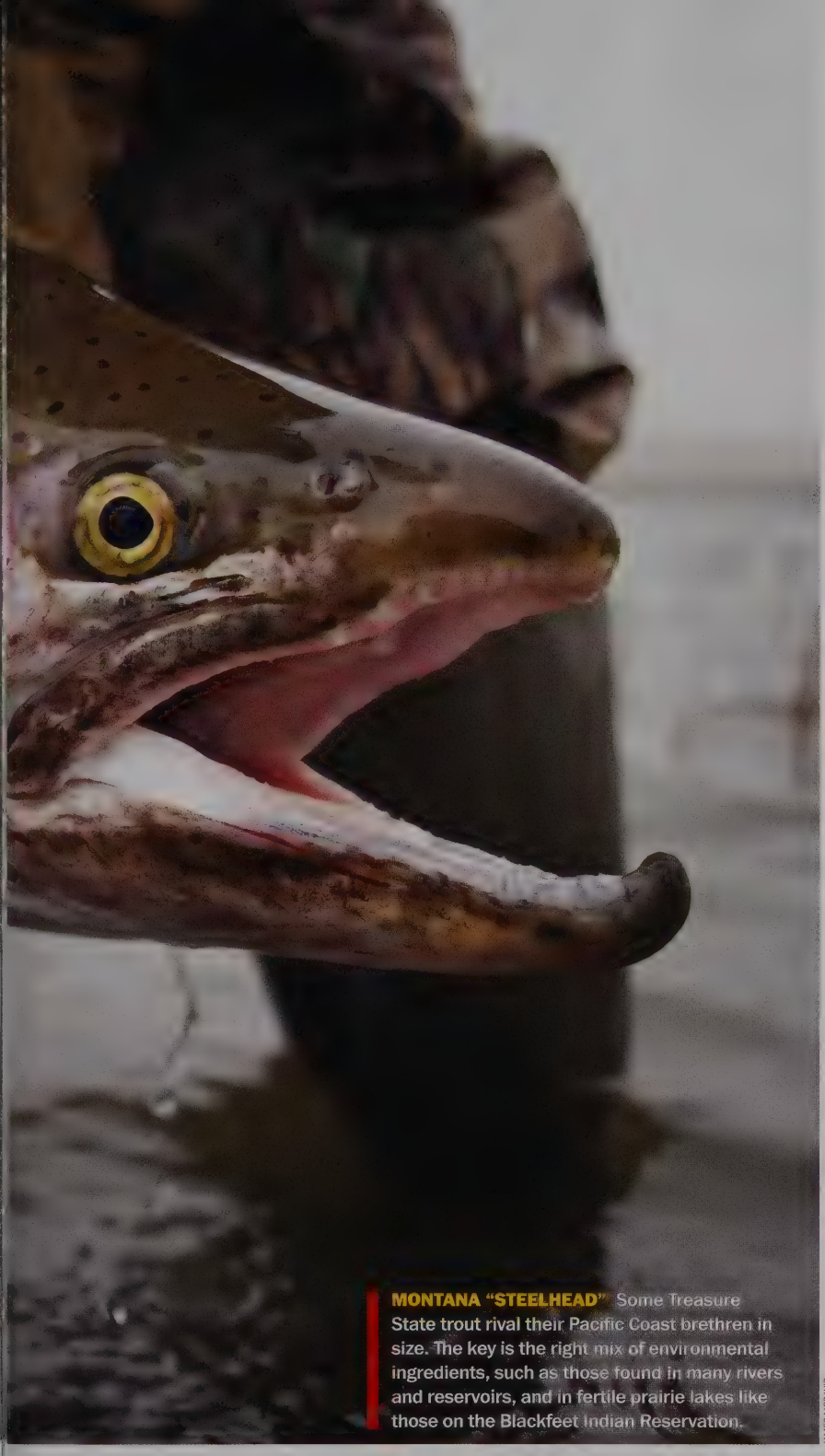
In addition to benefiting agriculture, the combination of coordination and cooperation has been a boon to the Bitterroot fishery. During several drought years in the 2000s, steady flows allowed the Bitterroot to remain open for fishing throughout the summer, even while FWP was forced to close the Blackfoot and other western Montana rivers because of low water.

According to Larry Schock, the DNRC regional water resources engineer in Missoula, irrigators used only two-thirds of their legally entitled water during the drought of 2013, leaving the rest in the river. "The coordination between our office and FWP makes it possible to have sustained flows on the river when they're most needed," he says.

The Bitterroot is one of the most heavily fished waters in Montana. The river and its fishery support guides, outfitters, fly shops, restaurants, and lodging establishments up and down the valley. Victor resident Jack Mauer has operated Wapiti Waters, a guiding and outfitting business, for nearly 40 years. Spending at least 100 days a year on the Bitterroot guiding clients, he understands as well as anyone the value of maintaining flows that keep trout populations healthy. "Without Painted Rocks, FWP, DNRC, and the others who care about this river, we'd be in a world of hurt," he says. "We've got conscientious irrigators. We've got FWP's 15,000 acre-feet to work with. There's cooperation, and it's a great thing."



A RECIPE FOR



MONTANA "STEELHEAD" Some Treasure State trout rival their Pacific Coast brethren in size. The key is the right mix of environmental ingredients, such as those found in many rivers and reservoirs, and in fertile prairie lakes like those on the Blackfeet Indian Reservation.

JAMES MCDAVID

BIG TROUT

Start with a **cold, clean river,** add **organic elements** and compounds that increase fertility, **warm the water** slightly in **sunshine,** then make sure too many fish aren't competing for food. Mix thoroughly. **Serves many happy anglers.**

BY JEFF ERICKSON

Up until that point in my young life, it was by far the biggest trout I had ever seen. My dad and I crouched behind cottonwoods along the bank of the lower Gallatin River near Bozeman Hot Springs. "That brown must be at least five pounds," Dad said. The massive trout swayed leisurely just under the surface, tight against a large, downed cottonwood. Every so often it would tilt its snout upward to casually sip an imperceptibly tiny insect floating past.

Even at 14, I knew that such a massive trout was typically caught with bait, a lure, or a streamer rather than with a dry fly. Dad encouraged me to try anyway. So I heaved out a few sloppy casts until the big brown sensed our presence and, to my great disappointment, slowly sank under the tree and disappeared.

I'll never forget the thrill of casting to that massive fish. Even now, years later, the sight of a big trout sipping dries always gets my adrenaline going. I've hooked and landed more than a few over the decades, and in doing so have learned a lot about how trout grow to trophy size and why fish in some Montana waters grow bigger than those in others. ▸▸

LOTS OF FOOD

In addition to clean, cold, and abundant water—which salmonids of all sizes require—large trout need plenty of food. "To grow big, trout have to either eat a lot of little things or some big things—and then live a long life," says Mike Hensler, FWP fisheries biologist in Libby.

Some of Montana's most productive trout food factories are highly fertile tailwater fisheries like the Missouri River below Holter Dam and the Bighorn River downstream from Yellowtail Dam. Water released from the base of dams is rich in nutrients from the lake bottom and maintains moderate temperatures and steady flows year-round. Minuscule insects like midges and tiny animals like scuds thrive in these gentle, slow waters. So prolific do the little creatures get that trout can grow large simply by staying in one spot and feeding on the rich array of aquatic life flowing past.

But a trout can become only so big feeding solely on zooplankton and aquatic insects. To grow longer than 20 inches, it needs a more substantial diet. For instance, browns feed on insects throughout their lifetime, but at an early age they also start eating minnows, leeches, and crayfish. As they grow bigger, they even consume mice and voles that tumble into the river. Bull trout, which can reach 25 pounds in Montana, switch from an insect to fish diet early in life. As bulls get bigger, so do their prey. Anglers on the Blackfoot River or South Fork of the Flathead regularly report reeling in a nice cutthroat only to have a bull trout swim up from the depths and devour their catch.

The ultimate weight-gain food for trophy trout is the kokanee, a small lake-dwelling salmon that lives in some western Montana reservoirs like Lake Koocanusa. Hensler says that the large rainbows and bull trout taken from the Kootenai River below Koocanusa get big by eating the small salmon that pass through the turbines of Libby Dam. "No other prey offers the caloric intake of a kokanee," he says. "They're like candy bars for fish."

Trout grow massive below other dams too. In the 1970s, the famous fly-fisherman and author Gary Lafontaine wrote of catching huge browns below Hauser Dam on the Missouri River using streamers to mimic suckers and other forage fish disoriented or injured after coming over the spill gates.

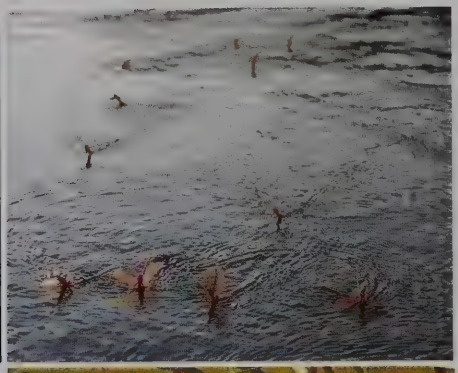
Of course, what qualifies as a "big" trout is both relative and subjective. In Montana's most productive rivers, 20 inches is generally the threshold for hugeness—except in some lower stretches, where anglers occasionally hook into fish 24 inches or longer. Yet in headwater streams, where trout rarely top a foot long, a 13-incher is considered massive. And to a kid catching his or her first trout, even an 8-incher can be a trophy.

GEOLOGY, CHEMISTRY, FERTILITY

To grow big trout, a lake or stream needs the right combinations of water chemistry and fertility, which are determined by a watershed's geology. "Carbon, nitrogen, and phosphorous in the soil are the building blocks for algae, which feed insects, which in turn trout need to grow," says Pat Saffel, FWP regional fisheries manager in Missoula. Those ideal conditions exist in north-central Montana, once a vast seabed covered in the calcium-rich shells of clams and other aquatic life. Small lakes in this region, like the famous ponds of the Blackfeet Indian Reservation, grow football-sized rainbows that gorge primarily on scuds, or freshwater shrimp, that thrive in the fertile waters.

Another example of geologically fertilized water is the Madison River—and even-

Writer Jeff Erickson lives in Helena.



FOOD FACTORIES Most of Montana's biggest trout reside in waters that produce large quantities of food the fish need to grow big and fat. Clockwise from top left: Scuds are tiny freshwater shrimp found in many tailwater fisheries and prairie ponds; some trout can grow big eating just mayflies if the current is slow enough; larger trout consume minnows and other small fish; the most fattening forage are kokanee, a small salmon species found in some reservoirs; dams provide steady water temperature and flows conducive to growing big fish.

CLOCKWISE FROM UPPER LEFT: WIKIPEDIA; SHUTTERSTOCK; SHUTTERSTOCK; SEATTLE AQUARIUM; STEVEN AXFE

THE GOOD NEW DAYS? The Wall of Fame in Dan Bailey's Fly Shop in Livingston displays silhouettes of trout over 4 pounds caught in the Yellowstone and nearby waters during the 1960s and '70s. With the advent of catch-and-release, the store stopped making new additions, which were encouraging the harvest of large trout that otherwise could be caught again. Though the wall seems to represent the glory days of Montana fishing, in fact the Yellowstone and other Montana trout rivers—thanks to catch-and-release and laws protecting water quality and habitat—continue to produce as many big fish as ever.

tually the Missouri River and its productive upper reservoirs. The aquatic life in those waters thrives in the fecund mix of iron, sulfur, sodium bicarbonates, and other elements and compounds brought to the earth's surface by mudpots and geysers near the river's source in Yellowstone National Park. Though best known for its abundant 15- to 17-inch trout, the Madison can produce huge fish too. In 2006 a local guide caught a 30-inch, 10-pound brown on a caddis pupae in the stretch between Hebgen Lake and Quake Lake.

Some of Montana's biggest trout live in streams that benefit from a food chain enriched by calcium carbonate dissolved when coldwater springs percolate through limestone bedrock. Among the best examples of these are the famous Paradise Valley spring creeks feeding the Yellowstone River: Armstrong/DePuy and Nelson's. Another place where trout grow big is in reservoirs, such as Canyon Ferry and Holter. They produce abundant insects and prey fish that fatten trout, and the lack of current saves the trout energy they can put into growing larger.

Highly fertile water can be a mixed blessing. For instance, Georgetown Lake grows big trout but also vast amounts of aquatic vegetation that make it susceptible to winterkill. That occurs when snow blocks sunlight, causing plants to die and stop producing oxygen needed by fish. The plants also decompose, a process that sucks up remaining oxygen.

Such rich nutrient levels are rare in mountain headwater streams. Though essential for cutthroat trout and bull trout spawning and rearing, those scenic, crystal-clear creeks can't grow large fish. Fed by ice-cold snowmelt, most mountain streams run through bedrock containing few minerals. What little life-providing organic matter they do have comes from decaying tree branches and conifer needles that fall into the stream.

Farther downstream, where that same stream emerges from shady forest into sunny and fertile bottomlands, it's a different story. Big trout—browns especially—show up more frequently in middle to lower stream reaches, where the water warms slightly and the substrate is richer in nutrients to support larger and more diverse aquatic life. Those waters also contain abundant logs and undercut banks that fish use to escape predators and live longer.

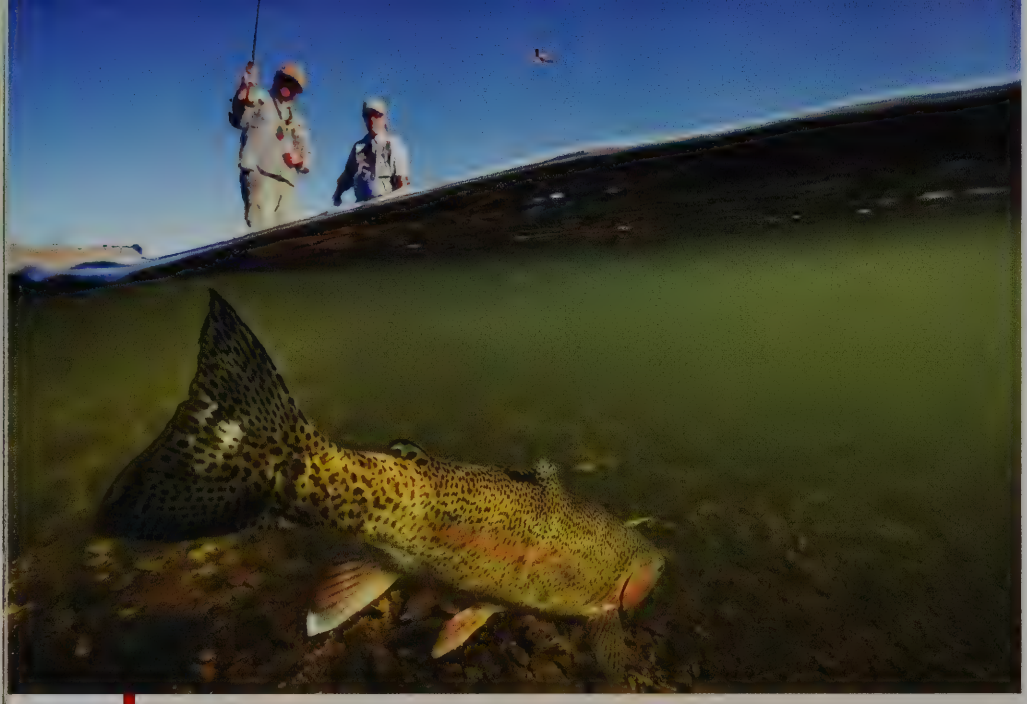
That's the main reason browns grow bigger than rainbows and cutthroat trout in many Montana rivers: The species is better suited to the warmer lower stretches. Cutthroat in particular require colder, cleaner waters, which are far less productive.

ROOM TO GROW

Just as a bull elk needs to escape hunters for five or six years to grow a seven-point rack, a trout can't reach trophy size—or get caught again by another angler—if it ends up as someone's dinner. That's the logic behind catch-and-release.

Yet what's often not understood by anglers is that many trout actually could grow bigger if some rival trout ended up in the frying pan. "Geology and water define the physical and chemical characteristics critical to fish growth, but fish density determines the rest," says Travis Horton, FWP regional fisheries manager in Bozeman. No matter how productive they are, all streams and lakes have fixed "carrying capacities" and can produce only so many pounds of fish per acre. "Just like a pasture can support only so many pounds of

JEREMIE HOLLMAN



BIG MO RAINBOW Water released from the base of dams like Holter on the Missouri River are packed with nutrients that accumulate on the bottom of the reservoir. By midsummer the water downstream is a rich soup of aquatic and plant life that fosters the growth of large trout.

cattle, a lake or stretch of river can support only so many pounds of fish," says Horton. "You can have lots of little fish, or fewer bigger fish, or some combination. But it's rare, except in cases where the water is super fertile, like Georgetown or the Missouri below Holter, to have lots of big fish. Most aquatic systems simply can't support that."

According to Horton, rivers with lots of food but poor reproduction generally create the biggest trout because fish densities there are lower. "That's what you see on the Missouri below Ulm," he says. "That population has limited spawning habitat, so you don't have that many fish in the river, but you do have warmer water and tons of productivity."

On upper Rock Creek south of Missoula, where brown trout have recently overpopulated, Saffel says that harvesting more younger, pan-sized browns in the 10- to 13-inch range could improve the quality of the fishery. The reduction would make available more food to remaining trout to grow faster while reducing stressful crowding that hampers fish growth.

Similarly, on the Ruby and Beaverhead Rivers "additional harvest would help make room for some of those fish to grow faster and bigger," says Matt Jaeger, FWP area fisheries biologist in Dillon. "Those are incredibly productive rivers, but they aren't producing as many big fish as they could be."

Tim Tollett, a longtime outfitter on the Beaverhead, Big Hole, and Ruby Rivers and owner of Frontier Anglers fly shop in Dillon, believes that he and other guides would benefit from the increased harvest of smaller trout. "Our clients would catch bigger fish, and that's money in our pocket," he says.

There's no one-size-fits-all solution to making fish bigger, Saffel says. The effect of harvest on trout populations varies by species, fish size, and the waters where trout swim. "For instance, cutthroat on the upper Bitterroot have responded unbelievably well to catch-and-release," he says, because the species is so easy to catch it can be quickly overharvested. But because browns are harder to catch, Saffel adds, "it's really hard to overharvest brown trout."

WORTH THE TRADE-OFF?

FWP doesn't manage any fisheries specifically to produce trophy trout. "Our goal is to manage habitat and populations so they are as healthy as they can be," says Jaeger. "We try to provide the fishing experience that most anglers desire: the opportunity to catch plenty of trout with the chance for a trophy." Some trout harvest is allowed in most Montana rivers, but so few anglers keep fish these days that current harvest levels have no effect on populations. Saffel notes that in certain waters, regulations encouraging "selective harvest"—keeping a certain size range of trout—could produce more big fish or at least increase average fish size. But the trade-off would be fewer trout overall.

"It's up to anglers and what they want," says Saffel. "Right now the predominant approach on rivers is to release trout, and that has helped produce the great fishing you see in Montana today. But if anglers decide that they want some rivers to produce larger trout, we'd need to find some new ways of increasing harvest."

I was pondering all these complexities not long ago while battling the biggest trout of my life—a steelhead-sized rainbow. Unsurprisingly, I hooked it in water that had all the requisite components for raising such a monster: the Missouri River just below Hauser Dam. Unlike the big brown I saw with my dad years before, this massive trout took my fly. After easing it into the shallows and taking a few quick photos, I removed the hook and watched the arm-length rainbow glide safely back into the depths.

It was a fish I will remember for the rest of my life, a memory illuminated by something Mike Hensler, the Libby biologist, told me. "Catching big trout isn't easy," he said. "There aren't that many of them, and one reason they got big is because they are hard to catch."

Where to find the state's biggest trout

Montana is packed with many of the nation's most productive trout streams, rivers, and reservoirs. All grow big fish, but some produce more trophies than others. Listed here are waters where anglers have their best chance of catching particularly large trout.

RIVERS

- Lower Sun
- Missouri between Cascade and Holter Dam; between Ulm and Great Falls; below Fort Peck Dam
- Lower Beaverhead
- Lower Gallatin
- Upper Big Hole
- Madison below Hebgen Dam
- Lower Jefferson
- Musselshell
- Lower Bighorn
- Yellowstone below Livingston
- Kootenai below Libby Dam
- Upper Clark Fork

LAKES and RESERVOIRS

- Canyon Ferry
- Hauser
- Holter
- Deadman's Basin
- Georgetown
- Koocanusa
- Blackfeet Reservation Ponds

BILL MCDAVID

BACK YOU GO Releasing a big trout like this massive brown gives other anglers a chance to catch it down the road. But on some rivers, harvesting more trout in the 10- to 13-inch range could provides additional food and room for other fish to reach larger sizes.

WILL JORDAN

Making Things

After high levels of PCBs in Big Spring Creek were discovered coming from its Lewistown hatchery, FWP was faced with a dilemma: wait for other state and federal agencies to do, or start cleaning up the mess and winning back the local community's trust.

By Todd Wilkinson

A few months ago, Don Skaar and I were driving through the scenic pastures and mountain foothills outside Lewistown. Beside us ran the twisting bends and sparkling riffles of Big Spring Creek, one of the finest trout streams in central Montana. At a new fishing access site, we passed an angler in waders picking through his fly box to match an emerging hatch.

In that moment, I noticed a slight smile cross Skaar's face. Skaar is chief of the Special Projects Bureau for the Montana Fish, Wildlife & Parks Fisheries Division. He asked me if anything appeared odd in the scene before us.

At first I didn't know what he meant. But by day's end I would grow to understand that Big Spring Creek has become a paradox of sorts, a stream as wonderful as ever, yet in some surprising ways a creek that has been markedly transformed.

LOCAL PRIDE

A few miles southeast of Lewistown, Big Spring rises as a wondrous fountainhead. It erupts from the Madison limestone formation in the foothills of the Big Snowy Mountains as one of the largest natural springs in the state, flowing at 50,000 gallons per minute. The pure water, a source of pride for the community, is piped straight into Lewistown homes.

The artesian spring is also the headwaters of Big Spring Creek, which flows north through Lewistown to the Judith River, a tributary to the Missouri. The stream is home to a popular wild trout fishery.

Also at the creek's source, which produces reliable water flows and a near-constant water temperature of around 52 degrees, sits a historic, 93-year-old fish-rearing facility operated by FWP. Big Springs Trout Hatchery (the agency uses the plural) is Montana's largest coldwater fish production center. Up to two million fingerlings and young trout are raised here and planted in over 50 different waters across the state, including Canyon Ferry Reservoir, Fort Peck Reservoir, and community fishing ponds.

A century ago Big Spring Creek was treated like many waterways were—as a working river, with industrial activity lining its banks. During Lewistown's steady growth in the late 19th and early 20th centuries, a railroad roundhouse, coal mine, oil refinery, and brewing plant were established at various times on a floodplain along the creek known as Brewery Flats. To make room for the development as well as a railroad line and highway, several miles of the stream were straightened and armored on both banks with riprap.

CONTAMINATED FLOODPLAIN

In the late 1990s, FWP restored the original stream meanders along Brewery Flats, 2 miles upstream from Lewistown, and planted willows and sedges to naturally anchor the banks. Part of the restoration involved excavating and testing the mucky streambed soils, some of which revealed traces of known carcinogens called PCBs. An acronym for "polychlorinated biphenyls," PCBs were widely used throughout much of the 20th century in coolants for power transformers, in electrical component fire retardants, and for other uses. When PCBs were determined to be a toxic threat to human health in the 1970s, they were banned.

"After PCBs were detected in the vicinity of Brewery Flats, nobody was really surprised, given all the industrial activity that had gone on there before," Skaar said as we stood on the site.

FISHING SPRING CREEK FAS NEAR BREWERY FLATS. PHOTO BY WILL JORDAN

Right Again

WHAT HAPPENED? Clean enough to drink at its source, Big Spring Creek near Lewistown is central Montana's premier trout stream. When potentially harmful contaminants came from an unlikely source upstream, the community turned to FWP for answers.

FOUNTAINHEAD Built in 1922, FWP's Big Springs Trout Hatchery is set in a green oasis (left) surrounding the massive spring (above). Big Spring provides drinking water for Lewistown and water for the hatchery, which raises trout for stocking in lakes and reservoirs throughout Montana (though not in Big Spring Creek or other streams and rivers).

People were soon startled, however, by an unexpected discovery of PCBs nearby.

That find was made by a Lewistown fifth-grader named Isaac Opper. As part of a science project in 1997, the ten-year-old boy collected more than a dozen sediment samples along Big Spring Creek and sent them to labs for testing. When some of his samples from the creek upstream from Brewery Flats showed spikes in PCB levels, the boy's findings aroused attention. Contaminant levels should have been lower upstream from the abandoned industrial site, not higher. Isaac shared his news with the Montana Department of Environmental Quality (DEQ).

DEQ investigators visited the site over the next several years and corroborated the boy's discovery. In fact, as they moved upstream from Brewery Flats toward Big Spring itself, levels of PCB contamination in sediment samples grew increasingly higher.

Skaar will never forget the day in 2003 when a DEQ colleague phoned him at his office in Helena: "He said there's good news and some real bad news. 'The good news is that we believe we know where the PCBs are coming from. The bad news is that the contamination appears to be emanating from FWP's Big Springs Hatchery.'"

Skaar and his FWP colleagues, especially Jack Boyce, the hatchery's manager at the time, were stunned. "We had no idea where the PCBs were coming from," says Boyce, who retired in 2006. "We checked the fish food and it was clean. Then one of our guys Googled 'PCBs' and 'paint' on the Internet. That's when we saw reports on PCBs in paint used on ships' hulls and causing pollution in ocean harbors."

FWP had found the contaminants' source: the coatings used by workers years earlier to protect the hatchery's 30 raceways, inside tanks, floors, and walls. Scientists later learned that when the paint cracked and chipped with wear, in some cases turning into fine dust, some of it was flushed into Big Spring Creek whenever raceways were emptied for cleaning.

When FWP officials searched department records, they found that the paint came from Washington-based Columbia Paint & Coatings. The paint had been made more resilient and pliable with PCB ingredients manufactured by Monsanto.

Boyce says FWP crews had no idea they were applying a potentially hazardous substance to the hatchery raceways. Similar paints were used nationwide until the early 1970s to line municipal swimming pools and even community water tanks.

SHOCK THEN RELIEF

The news shocked Lewistown residents. Their biggest immediate concern: the municipal water supply. Was it even safe to turn on their faucets? People living along the creek also feared that the stigma of PCB contamination might destroy property values. Area anglers wondered about the trout. "It's strange, but you take all of these things—the biggest being water quality—for granted until something like this happens," says Kevin Myhre, Lewistown city manager. "It was a shock and a wake-up call."

A collective sigh of relief came when public health officials revealed that the well collecting Big Spring water for municipal use was, by design, covered, secure, and PCB free.

The creek downstream from the hatchery, however, was another matter.

Scientists quickly deduced that PCB-contaminated paint particles and dust released from the hatchery had settled onto the creek floor and were being carried downstream for miles. The particles were ingested by aquatic insects that wild trout ate, which then accumulated in the fish.

Local citizens who either ate fish from

BAD CANS After PCBs were discovered emanating from its hatchery, FWP found that it had coated raceways with tainted paint from Columbia Paint & Coatings. Before PCBs were banned in the 1970s, paints were often made more resilient and pliable by adding the chemical compounds, manufactured by Monsanto.

TOP LEFT TO RIGHT: JOSEPH JENKINS; MONTANA FWP; CRAIG & LIZ LARCOM; MONTANA FWP; MUNGUS CONSTRUCTION

Todd Wilkinson of Bozeman is a conservation journalist and author of Last Stand: Ted Turner's Quest to Save a Troubled Planet.

WARNING
FISH IN BIG SPRING CREEK ARE CONTAMINATED WITH PCBs
Upper Big Spring Creek is restricted to catch and release fishing only for all species from the Highway 191 Bridge upstream to the Hansen Creek Dam and in the East Fork upstream to the East Fork Dam—by order of the Montana Fish, Wildlife and Parks Commission.
For more information, contact Fish, Wildlife and Parks at 538-4658 or Public Health and Human Services at 444-5306.
MONTANA

CLEANUP CREWS Once the Lewistown hatchery was determined as the PCB source, FWP contracted to have it and the creek downstream cleaned. Left: A notice warning anglers to release all fish on Big Spring Creek. Above: Crews removed all old paint and repainted contaminated raceways. Right: Vacuuming bottom sediment just downstream from the hatchery.

the creek, lived along it, or worked in the hatchery submitted blood tests to labs at the Centers for Disease Control. None showed elevated PCB levels.

Further examination found that fish raised in the hatchery and placed into Montana reservoirs and mountain lakes—no fish are stocked in Big Spring Creek or other streams or rivers—contained some PCBs. But the fish posed no health risk because they were too small when stocked to be caught and eaten and, as they grew to catchable size, PCB levels became highly diluted. Still, as a precaution, FWP destroyed more than 700,000 fish that were in raceways lined with PCB-tainted paint. And public fishing in Big Spring Creek was made catch-and-release only.

Though the contamination was less than initially feared, FWP was still in the hot seat. "The evidence was clear," Skaar says. "We were responsible. People were understandably mad and upset, and you can't blame them. They demanded to know how something like this could happen.

"We had lost public trust," Skaar adds. "We knew the only way to win it back was by admitting the mistake and fixing it."

Skaar says he and others in FWP's Fisheries Division agreed at once "that we could not sit back and wait for someone else—DEQ or EPA—to tell us what we needed to do. We took action."

To ensure that the remediation process was transparent, FWP formed a citizen advisory committee to review cleanup reports and provide public input. It was chaired by Lyle Gorman, a respected member of the community who represented creekside landowners. David Stuver, a longtime member of Trout Unlimited's Snowy Mountain Chapter, represented sportsmen's interests.

In the wake of the water contamination revelations, legal actions followed. More than 200 streamside landowners filed a class action lawsuit. As part of a damage settlement, Monsanto agreed to pay the plaintiffs $5 million, the state paid them $650,000, and Columbia Paint & Coatings paid $300,000. A second phase of litigation resulted in Monsanto paying $5 million to the State of Montana, most of which has been used to cover the cost of the $8 million cleanup and to purchase lands from willing sellers to provide more fishing and recreational access along Big Spring Creek.

BIG SPRING CREEK PCB CLEANUP To no one's surprise, PCBs were discovered in the 1990s during the restoration of a stretch of Big Spring Creek along an old industrial site 2 miles upstream from Lewistown called Brewery Flats. But when a schoolboy later discovered higher concentrations of PCBs upstream from Brewery Flats, state and federal health officials became concerned and started investigating. It turned out the source was old PCB-contaminated paint lining the raceways of FWP's Big Springs Hatchery.

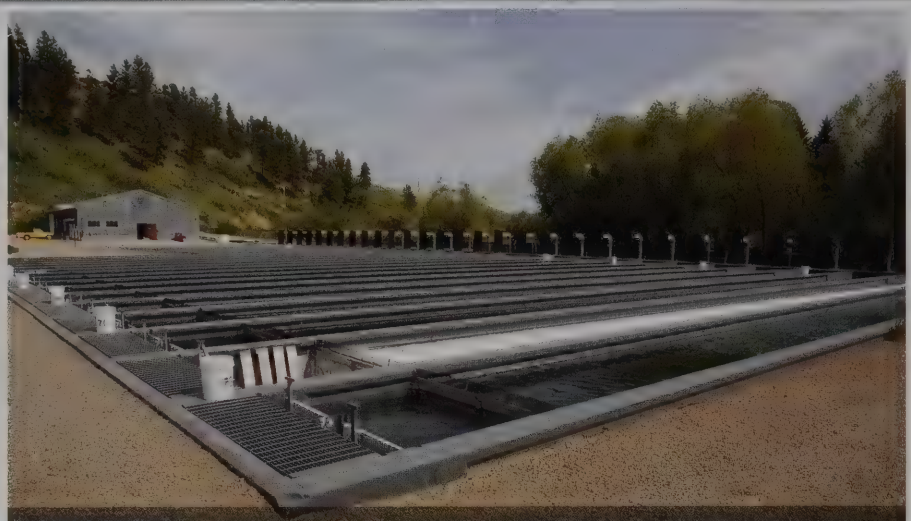
An eight-person crew removed more than 1,500 tons of sediment in a 3-mile stretch downstream from the hatchery where PCB concentrations were highest.

The sludge was drained in settling ponds and then trucked to a landfill near Great Falls.

MAP BY LUKE DURAN/*MONTANA OUTDOORS*
PHOTO: MUNGUS CONSTRUCTION

VACUUM, BUT SLOWLY

Many potential fixes to the contaminated stream were considered. One of the options,



SILVER LINING One bright spot in the PCB contamination saga was that FWP's Big Springs Trout Hatchery was revamped with new raceways, tanks, and other features that allow it to produce fish more efficiently and cost-effectively.

expensive and roundly rejected by streamside residents and local anglers, was to divert Big Spring Creek into a temporary artificial channel, conduct intensive paint chip removal in the dry riverbed, then put the stream back in place.

The alternative that FWP advocated—one that Stuver says he initially opposed—was to slowly and methodically vacuum, or dredge, underwater contaminants from the streambed for 3 miles downstream from the hatchery where PCB levels were highest. Stuver says he initially feared that the process would remove all aquatic invertebrates and render the stream lifeless. But after FWP officials explained that only a small area of the stream would be dredged at one time, and that bugs would quickly recolonize vacuumed areas, he and others on the citizen advisory committee eventually agreed to the plan.

Over a period of three summers, an eight-person crew removed more than 1,500 tons of sediment downstream from the hatchery. The sludge was drained in settling ponds and trucked to a landfill near Great Falls, Skaar says. Approximately 95 percent of the PCBs have been removed from the most heavily contaminated stretch. The minor amounts that remain are below health advisory levels and will be encased by natural silt and remain deep within the streambed, Skaar adds.

In the hatchery, FWP removed all paint, replaced old raceways, and installed new tanks and other equipment. Jim Drissell, current hatchery manager, says that in addition to being PCB free, the hatchery "is now a far more efficient fish-rearing facility."

Trevor Selch, FWP's fisheries pollution biologist, was brought in to oversee stream health monitoring. For three years before the dredging began, Selch and his team collected samples of aquatic invertebrates downstream from the hatchery. Insect numbers and diversity served as a baseline for comparison after dredging was completed.

> "When this started, they looked us in the eye and said, 'We'll make it right again,' and they did."

Results were promising. "In the post-dredging samples, aquatic organism diversity and total abundance were greater than before the cleanup," Selch says.

Initially dubious of FWP's cleanup proposals, Stuver says today that the department did an admirable job. "I admit that I was skeptical and worried that any heavy-handed option like dredging would only make the problem worse," he says. "But the department hung in there to see the cleanup through."

WORTH CELEBRATING

Big Spring Creek has again become a natural emblem of Lewistown's high quality of life. Settlement money has contributed to creating a 20-mile-long recreation trail and six fishing access sites. The old Brewery Flats roundhouse is being converted into a nature center. Anglers scared off by the contaminant reports have returned. So have walkers, cyclists, and bird watchers.

Richard Opper, head of Montana Public Health and Human Services (and father of the boy whose science project launched the PCB investigation), counts Big Spring as one of his favorite trout streams. To put the creek in perspective, he recounts a recent vacation in France, where he and his wife visited a village holding a festival honoring the river flowing through it. "Along the bank there were musicians playing, artists selling their wares, and restaurants serving up great food. It was a big deal," Opper says. "But that river had nowhere near the water quality you find in Big Spring, out there in central Montana, the source of what could be the finest drinking water in the world. It's Lewistown's pride and joy. And today there's a self-sustaining wild trout population thriving in it. To me, that's something truly worth celebrating."

City manager Myhre has his own take. "FWP has been a great partner to Lewistown for a long time, and, you know what, nobody is perfect," he says. "When this started, they looked us in the eye and said, 'We'll make it right again,' and they did. Not only that, there's more public appreciation for what Big Spring Creek represents to our town in ways that didn't exist before."

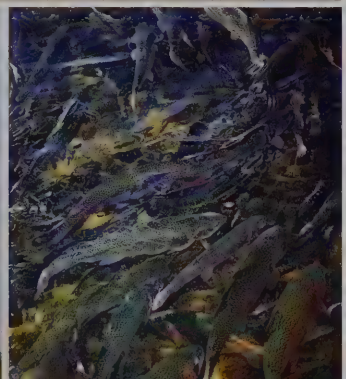
All of which brings us back to the question that Skaar initially posed to me: "Is there anything that appears out of the ordinary along the banks of Big Spring Creek today?"

The answer is both "No" and "Yes." Thanks to FWP's remediation and local residents' dedication, the stream is as scenic and as popular with anglers as ever. At the same time, though not visible to passersby, something extraordinary did occur at Big Spring Creek. After a scare in which they thought they'd lost it for good, a community that cherished its remarkably clean and pure trout stream learned to value it even more.

Since 2014 and continuing for five years, FWP is sending sediment samples from various reaches of Big Spring Creek to labs for testing. If PCB levels in the samples are consistently below a federal safety maximum level, the EPA will determine whether to give the stream a clean bill of health. FWP officials say that the first tests, conducted last year, showed levels well below the EPA maximum.

CLOCKWISE FROM TOP LEFT: CRAIG & LIZ LARCOM; STEVEN AKRE; CRAIG & LIZ LARCOM; SHUTTERSTOCK; WIKIPEDIA; MONTANA RURAL HEALTH INITIATIVE

AS GOOD AS EVER Twelve years after PCBs were first discovered coming from Big Springs Hatchery, nothing at the facility or along the stream appears out of the ordinary. Anglers continue to fish the crystal-clear water, lush with aquatic vegetation, and catch fat brown and rainbow trout. Cyclists and hikers are using new trails built with remediation money. Hatchery workers continue to produce trout for Canyon Ferry and other large reservoirs as well as ponds throughout the state. And Lewistown still boasts of having the purest spring water in the world. In many ways the town, the stream, the fishery, and the hatchery have never been better.



Panfish ON THE Prairie

Eastern Montana's fishing ponds may not draw the tourists that mountain trout rivers do. That's fine with local anglers, who are happy to have places to catch abundant, tasty fish all to themselves.

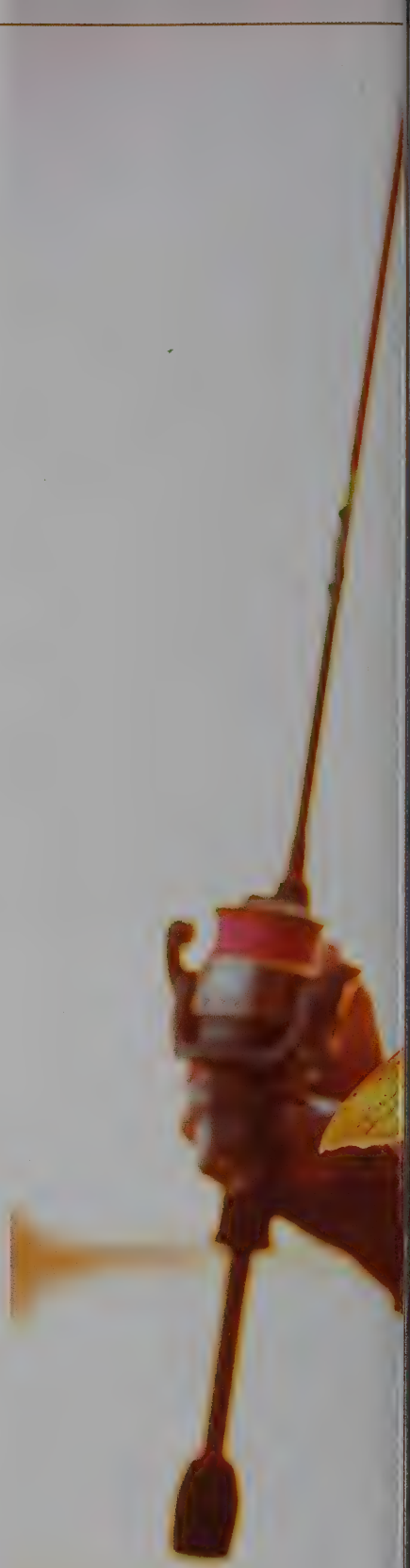
By Jack Ballard

It's not what you'd expect to hear from a fisheries manager in a state heralded for its world-class trout streams, where anglers from across the country flock to fish snow-fed rivers for rainbows, browns, and cutthroat. "I'd like our region to lay claim to being the panfish capital of Montana," says Steve Dalbey, Montana Fish, Wildlife & Parks regional fisheries manager in Glasgow. "We have some of the state's best fishing for crappie, bluegill, and perch in this region, and we're proud of that."

Panfish?

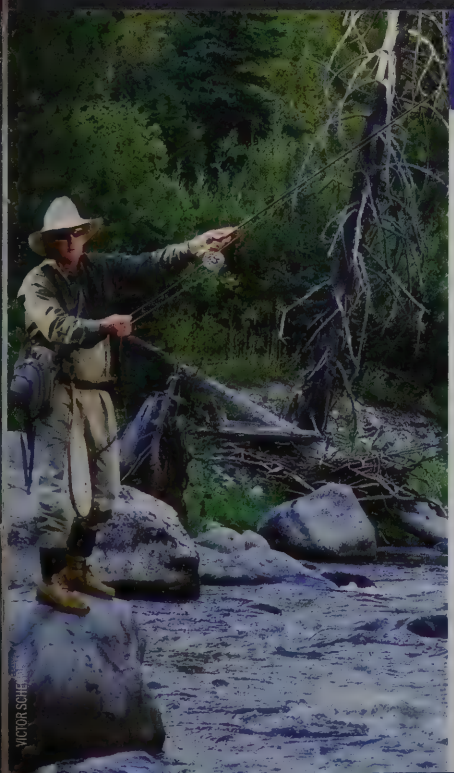
Dalbey's proclamation underlines the contrast between fishing opportunities in Montana's two halves. As you cross the state from west to east, trout rivers and streams peter out just as the mountains do. But hundreds of ponds and several major reservoirs dot the rolling prairie landscape east of a line from about Shelby southeast to Broadus. The big waters—Fresno, Nelson, and especially Fort Peck—offer top-notch angling well known to Montanans and a growing number of nonresidents. But few people are aware how essential small ponds are for providing fishing opportunities to local anglers.

"People in eastern Montana like to fish just as much as the people who live in Bozeman and Dillon and Hamilton," says Dalbey. "But they can't go out to a Gallatin River, or a Beaverhead, or a Bitterroot. In many cases, these ponds are the only fisheries that small communities have."



SHUTTERSTOCK

NICE EATER Yellow perch are mainstays for eastern Montana pond anglers of all ages. The fish are found throughout the region, bite readily, and are delicious.



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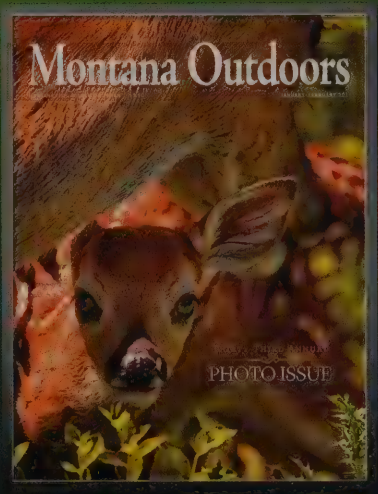

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OPPORTUNITIES

Though Montana's fishing ponds (including small reservoirs, sometimes called "stock ponds") garner far less attention than the state's storied trout streams, they provide no less in the way of recreation. Found in all of FWP's seven regions but most abundantly in the state's eastern half, ponds often offer more fishing diversity than cold-water streams. In addition to panfish, the prairie waters may contain rainbow trout, northern pike, bass, and channel catfish. Because sunshine and shallow water create fertile conditions, the fish often grow large. They're good to eat, too. Most river trout anglers in western Montana fish only for sport, releasing their catch. But the majority of fish taken from prairie ponds end up filleted, dredged in flour, and fried to a golden brown.

What's more, pond fishing is easy and relaxing. Many waters are small enough to fish from shore or a float tube—no big boat or trailer required.

OPEN TO PUBLIC ACCESS

In its two eastern regions (Region 6, the northeast, and Region 7, the southeast), FWP stocks 200 fishing ponds ranging from 1 to 100 acres open to public access. About half the ponds in Region 6 are on federal, state, or city holdings. In Region 7, roughly 40 percent of the ponds are on public property.

On private land, FWP provides fish and conducts population surveys every few years in exchange for landowners providing reasonable levels of public fishing access. "It's an old-school handshake approach. That's how ranchers like to do things out here," says Mike Backes, FWP regional fisheries manager in Miles City. Permission from the landowner is needed each time an angler goes fishing, but that usually requires no more than a phone call. Anglers can obtain the names of landowners who have ponds stocked by FWP by calling the regional headquarters (see "Get the guides," on page39.)

Many pond fishing opportunities were created by FWP in partnerships with local communities and conservation groups. For instance, Home Run Pond in Glasgow is "highly supported by the town and heavily used by kids," says Dalbey. A recently acquired fishing access site on 70-acre Bailey Reservoir—a lake 25 miles southwest of Havre that supports northern pike, yellow perch, rainbow trout, and crappie—was purchased with fishing license dollars and a donation from the Great Falls Chapter of Walleyes Unlimited. "It's an incredibly popular ice-fishing destination that gets a lot of use in the summer as well," Dalbey says.

> "In many cases, these ponds are the only fisheries that small communities have."

SUNNY FORECAST Bluegills, a species of sunfish, are stocked in deeper ponds where FWP establishes multi-species fisheries. Other fish include bass, crappie, northern pike, perch, and, in larger waters, catfish.

THE SHALLOWNESS PROBLEM

The biggest challenge in managing pond fisheries is keeping fish alive in the harsh prairie environment. Summerkill occurs when the shallow water becomes too warm to hold sufficient dissolved oxygen. Winterkill is when deep snow blocks sunlight from underwater plants. They die and stop producing oxygen, while microbes that consume the decomposing vegetation use what oxygen remains. Because shallow ponds are more susceptible to summerkill and winterkill, Region 6 requires them to be at least 13 feet deep before it will establish a multi-species fishery. Minimum depth for the multi-species ponds in Region 7, which receives less snow, is 11 feet.

Adding to the shallowness problem is sedimentation. After several decades, ponds fill with soil eroding from surrounding lands. Many eastern Montana ponds are 40 years or older. "Some are getting to the point where they are just too shallow for fish to survive," says Backes.

FWP helps some vulnerable pond fisheries with wind-driven aerators that pump oxygen into the water. "The objective is to give fish a fighting chance to survive winter in the ponds that have marginal habitat," says Dalbey. FWP has installed and maintains roughly 20 aeration systems in eastern Montana. The Bureau of Land Management helps with aerator installation and maintenance on ponds on federal land.

In what are known as "put-grow-and-take" ponds, FWP stocks rainbow trout every few years. "The trout grow very fast," says Backes. "If a 2-inch fingerling planted in spring survives one winter, it could very well be a 2-pounder by the end of the following summer."

Backes acknowledges that summer- and winterkill can be management headaches, "but even so, it amazes me how often trout survive three or even four years out here," he says. "And when they live that long with all the forage these ponds have, they grow like gangbusters, getting up to 5 or 6 pounds."

Almost all rainbow trout planted in eastern Montana ponds are reared at FWP's Fort Peck, Miles City, Bluewater Springs, or Big Springs Hatcheries. "Many ponds are now

Jack Ballard, a writer in Red Lodge, has written several books on natural history.

ROBERT MICHELSON

stocked via helicopter, which lets us plant fish sooner in spring, when roads are still muddy and impassable," says Backes. "It's less expensive and more efficient than having to drive trucks all over eastern Montana."

In multi-species fisheries, FWP stocks a combination of fish that may include smallmouth or largemouth bass, northern pike, crappies, bluegill, perch, and, in larger waters, channel catfish. Unlike trout, which need moving water to spawn, many coolwater and warmwater species can reproduce in most ponds or reservoirs and maintain their populations.

While state hatcheries provide the coldwater trout, most of the fish that FWP stocks in multi-species ponds come from other FWP-stocked ponds. "We trap and transfer through a very careful process," says Dalbey. "If Pond X has lots of bluegill and it tests negative for aquatic invasive species, we'll trap some fish and test them for disease. If they are healthy, we'll transfer them to Pond Y. That's the most cost-effective way to jump-start a fishery."

Dalbey warns that moving game fish from one pond to another should be done only by trained fisheries biologists. "There's potential for spreading disease or invasive species, so it's critical to follow the strictest protocols," he says. "This is not something landowners or anglers should ever do on their own."

Keeping tabs on ponds from year to year is another challenge. "We don't have staff to check on every pond and see if it winterkilled or has some other problem," Dalbey says. His region has set up "creel boxes" at many ponds where anglers can submit notes on problems, good fishing, or anything else they encounter. Both regions also rely on anglers reporting pond conditions by phone or e-mail.

CLOSE TO HOME

Dalbey and Backes acknowledge that eastern Montana's fishing ponds will never attract anglers from Seattle or Minneapolis the way Fort Peck Reservoir or the Madison River do. That's fine by them. "The typical angler on our ponds is coming from less than an hour away," says Backes. "The ponds provide a local resource for fishing in a region where there aren't many other opportunities."

That's true for adult anglers and youngsters alike, adds Dalbey. "Conservationists are made, not born. If you want kids to care about a healthy environment, which we very much do, then you need to give them opportunities to be outside and enjoy outdoor recreation like fishing," he says. "We do what we can with the resources that are available. These ponds are just as important to eastern Montanans as the Big Hole or Gallatin Rivers are to western Montanans. The girl or boy who catches that first trout or perch in a pond could get hooked on fishing for life."

WHO NEEDS A MOUNTAIN STREAM? Clockwise from top left: Though smallmouth and largemouth bass are catchable from shore, a canoe or float tube allows pond anglers to cover more water; rainbow trout grow quickly in the fertile waters of eastern Montana; many fishing access sites were created as partnerships between FWP and local communities or sportsmen's groups; some towns hold kids' fishing derbies at their local ponds, which are often the only angling opportunity for many miles.

Get the guides

FWP's Regions 6 and 7 publish annual pond fishing guides. The booklets, which are updated annually, include maps, directions, and the latest sampling and stocking information. Obtain a guide by calling the Region 6 headquarters (406-228-3700) or Region 7 headquarters (406-234-0900). The Region 6 guide is also available online. Click the brown "Regions" tab at the top of the FWP homepage (fwp.mt.gov), then click on "Region 6" and scroll down for the link to the guide.

Twin crappies

CLOCKWISE FROM TOP LEFT: JACK BALLARD; JOSHUA BERGAN; JACK BALLARD; SHUTTERSTOCK; NEIL & MJ MISHLER

Alas, the poor starling

by Bruce Auchly

We come to praise starlings, not bury them. What? Praise starlings? Perchance to love them?

That's right, and why not? Shakespeare mentioned the species, if not admired the bird's ability to mimic sounds. In fact, the starling may be in North America only because of Shakespeare. But we'll get back to the Bard in a moment.

First, let's look at the starling. Or close your eyes, if you must, for love looks not with the eyes but with the mind.

Birds at the local feeder are natives and non-natives alike. Some are well dressed, such as the goldfinch, while others are drab and homely, like the house sparrow. At first glance the dark-feathered starling (proper name European starling) appears to be a somber winged visitor, an undertaker of the avian crowd.

Closer examination, however, reveals a bird of many colors. At a distance, starlings look black. Yet after a midsummer's night, their feathers take on an iridescent purplish-green, offset with yellow beaks. In winter plumage the birds are brown with brilliant white spots.

Even so, if you Google "America's most hated bird," sure enough, up pop starlings. They drive out native birds, invade farmers' fields, and gobble up fruit in orchards. To their sins, it would appear, there is no end, no limit, measure, bound.

In summer, however, the birds also consume beetles, grasshoppers, and caterpillars, making them the gardener's friend. And there is some dispute as to whether starlings really drive native cavity-nesting birds, like the bluebird, from their nests to the extent they've been accused.

If anything, it would appear that the starling is disliked for doing what we humans have done so successfully: adapting, being fruitful, and multiplying.

So what is Shakespeare's role in all this?

In the Bard's play *Henry IV, Part I*, he writes about the starling's ability to be taught the name of a prisoner and repeat it over and over to King Henry. Starlings are excellent vocal mimics, able to replicate the songs of about 20 bird species as well as other sounds. It's said Mozart kept a starling as a pet, teaching it to sing bars of his music.

In the late 1800s, a fan of Shakespeare released several dozen starlings in New York City, allegedly to bring Old World birds to the New World. Apparently he also released at least four other European bird species, all of which died.

Not so the starling.

Today there are an estimated 120 million in North America, making them among the most abundant bird species here, along with the American robin, dark-eyed junco, red-winged blackbird, red-eyed vireo, white-throated sparrow, mourning dove, and yellow-rumped warbler.

So love a starling or not; it's up to you. But the birds are here, are subtly beautiful, and sometimes get a bad rap.

Then again, the course of love never did run smooth.

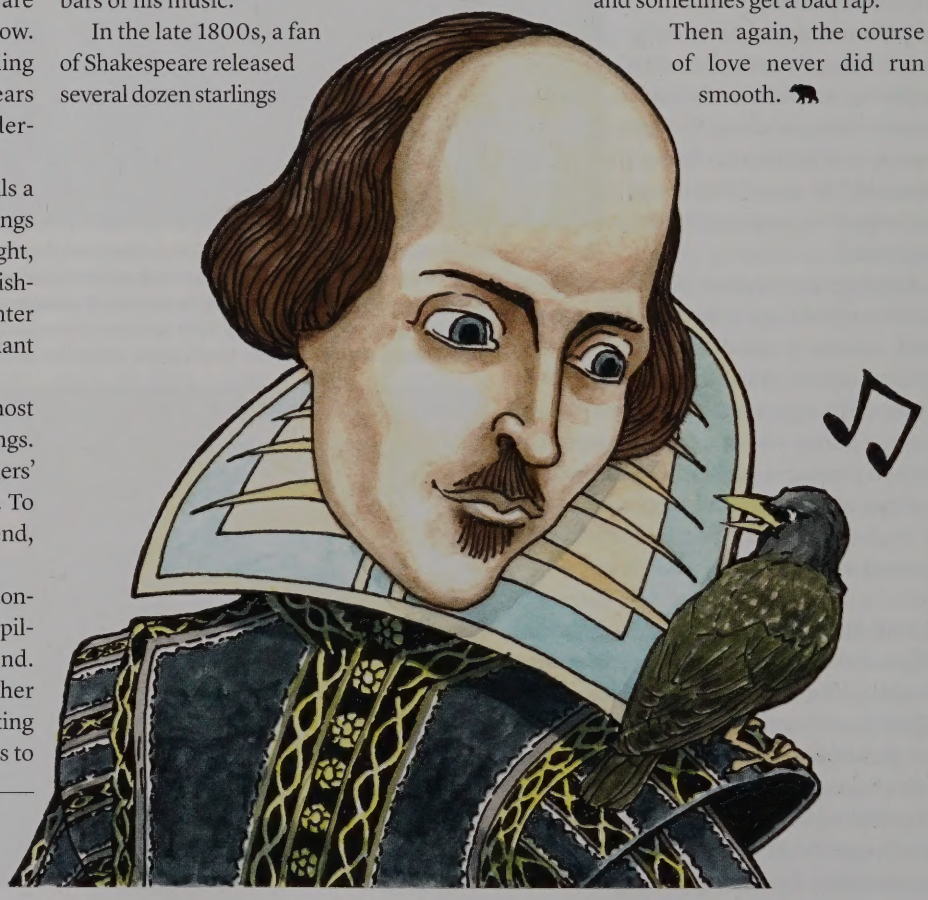
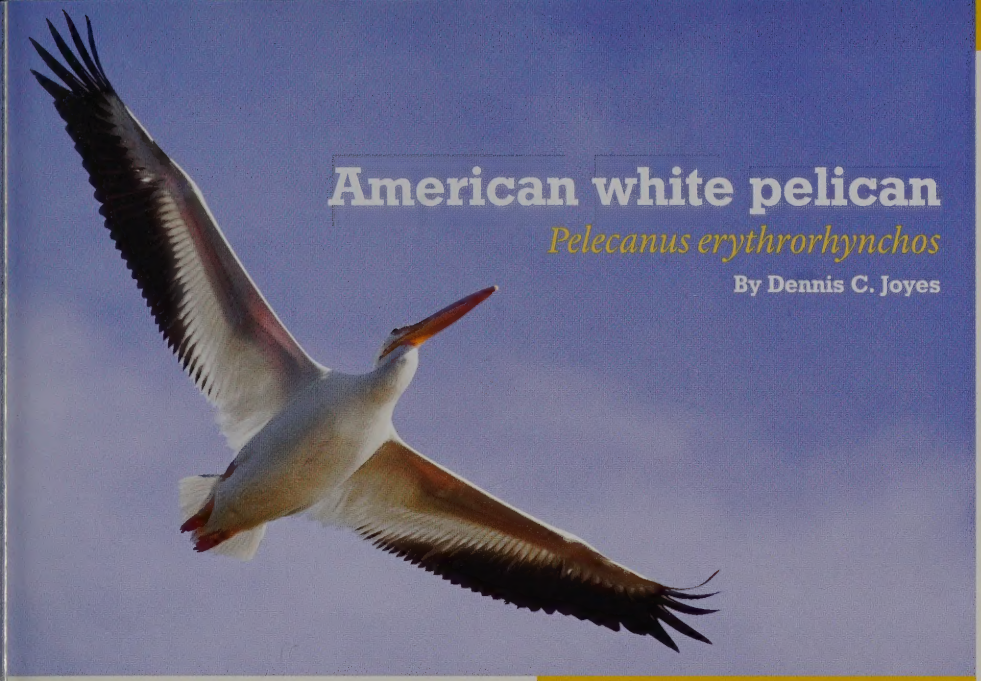


ILLUSTRATION BY T. R. JENSE

Bruce Auchly manages the FWP regional Information and Education Program in Great Falls.



American white pelican

Pelecanus erythrorhynchos

By Dennis C. Joyes

"*Pelicans*?" I was telling two friends from back East what they might expect to see on a bird watching trip to Montana. They were familiar with brown pelicans along the Eastern Seaboard but were surprised to learn that the larger white pelican breeds in the continent's western interior, including Montana. Like my friends, many people think of pelicans as saltwater birds, typically seen perched on a pier in an ocean harbor, not flying over cattle, pronghorn, and sage-grouse on the open prairie.

Scientific name

Pelecanus is the Latin word for "pelican" and ***erythrorhynchos*** is from the Greek *erythros* ("red") and *rhyncos* ("bill.")

Appearance

The white pelican is unmistakable—a large white bird with black flight feathers, an enormous orange bill, and a wingspan that stretches 8 to 9 feet (among North American birds, only the California condor has a longer span). On land, white pelicans are awkward, almost clownish, with short legs, big feet, and that massive bill. But in water the birds are strong swimmers, moving single file or several abreast, like busy little tugboats. And in flight, pelicans are magnificent. You can often see them from a distance of several miles soaring in formation over prairie lakes like a squadron of white B-52 bombers.

During breeding season, both sexes grow a temporary 3-by-3-inch bump on the top of their bill.

Range

White pelicans breed on remote islands from western Canada south to Colorado, and from Great Salt Lake in northern Utah east to Minnesota. Montana's four breeding colonies are at Medicine Lake National Wildlife Refuge (NWR), Canyon Ferry Lake, Bowdoin NWR, and Eyraud (Arod) Lakes Waterfowl Production Area, northeast of Choteau. The total breeding population for the state stands at just under 13,000 birds. The Medicine Lake and Bowdoin colonies winter along the Gulf of Mexico, departing in stages during late October, while the two western colonies cross the Rocky Mountains to winter on the coast of southern California and western Mexico.

Food

Pelicans feed mainly on fish, a diet that puts them at odds with anglers who accuse them of depleting game fish stocks.

Yet those who study pelicans maintain that the birds feed almost entirely on forage fish such as suckers, carp, and minnows. At Canyon Ferry Lake, a study showed that 90 percent of the pelican's diet consists of carp and crayfish, while at Bowdoin NWR the birds feed almost exclusively on carp.

White pelicans fish by dipping their beaks into shallow water to scoop up small fish (unlike oceanic brown pelicans, which plunge dive for their prey). The birds feed cooperatively, forming parallel lines or semicircles in order to drive prey into shallow water.

White pelicans' feeding habits in smaller lakes and rivers are unknown. Low water levels, for example, may bring game fish within reach of pelicans. Regurgitated hooks and lures found in pelican colonies show that the birds sometimes capture game fish injured or slowed by anglers.

Social Behavior

Pelicans are social birds that spend their lives migrating, nesting, feeding, and loafing in large groups. In summer, flocks disperse to surrounding marshes, lakes, and rivers to forage, often traveling 100 to 200 miles from their home colonies. Pelicans live as long as 25 years. Except for low grunts made during courtship or conflict, the birds are silent throughout their long lives.

Reproduction

Pelican courtship begins in late April or early May, shortly after the birds arrive at their island nesting sites. Nests are a shallow depression on the ground rimmed by a ridge of gravel, soil, or vegetation. The female lays two or three dull white eggs, which hatch within 30 days. Both parents incubate the eggs and feed the young, which reach down their parents' throats for regurgitated food. Owing to intense sibling rivalry and aggression, one chick usually won't survive. Pelican young leave the nest after three weeks, at which time they form semi-independent groups known as crèches. Parental feeding continues for another two months.

Conservation

Because of DDT and other environmental toxins, white pelican numbers declined severely in the mid-20th century. Environmental regulations have allowed populations to recover. Though pelican numbers in Montana are considered stable, populations require constant vigilance. Pelicans often abandon their nests and nesting colonies when disturbed by boats and low-flying aircraft. The birds are also susceptible to West Nile virus, which struck the Medicine Lake refuge in 2006-07 and killed nearly half the pelican chicks. More recently, oil contaminants have been detected in the tissues of Montana white pelicans that winter on the Gulf of Mexico, likely from the Deepwater Horizon oil spill of 2010.

Writer Dennis C. Joyes is a frequent visitor to Montana who lives in Toronto, Ontario.

SHUTTERSTOCK

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PARTING SHOT

NO ONE AROUND FOR MILES Relatively few anglers fish the upper Gallatin River in Yellowstone National Park, providing plenty of solitude for those who do. See page 10 for more on this beloved Montana trout stream. Photo by John Juracek.

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